Appendix C.4
Johnson & Ettinger Model - Results
Inhalation of Volatiles from Groundwater
Future Child Resident Scenario - RME
Southwest Prperties, Wells G&H Superfund Site, Operable Unit 2
Beerjona Auto Parts

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

INCREMENTAL RISK CALCULATIONS:

		Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
71556	1,1,1-Trichloroethane	NA	NA	NA	1.33E+06	N/A	NA	NA
76131	Trichloro-1,2,2-triflouroethane, 1,1,2-	NA	NA	NA	1.70E+05	N/A	NA	NA
79005	1,1,2-Trichloroethane	NA	NA	NA	4.42E+06	N/A	NA	NA
75343	1,1-Dichloroethane	NA	NA	NA	5.06E+06	N/A	NA	NA
75354	1,1-Dichloroethylene	NA	NA	NA	2.25E+06	N/A	NA	6.9E-05
120821	1,2,4-Trichlorobenzene	NA	NA	NA	3.00E+05	N/A	NA	NA
95501	1,2-Dichlorobenzene	NA	NA	NA	2.77E+07	N/A	NA	NA
541731	Dichlorobenzene, 1,3-	NA	NA	NA	6.88E+04	N/A	NA	NA
106467	1,4-Dichlorobenzene	NA	NA	NA	7.38E+04	N/A	NA	2.5E-06
78933	Butanone, 2- (MEK)	NA	NA	NA	2.23E+08	N/A	NA	NA
67641	Acetone	NA	NA	NA	1.00E+09	N/A	NA	NA
71432	Benzene	NA	NA	NA	1.75E+06	N/A	8.7E-10	4.3E-05
74839	Bromomethane	NA	NA	NA	1.52E+07	N/A	NA	NA
75150	Carbon Disulfide	NA	NA	NA	2.67E+06	N/A	NA	NA
108907	Chlorobenzene	NA	NA	NA	4.72E+05	N/A	NA	NA
75003	Ethyl Chloride	NA	NA	NA	5.32E+06	N/A	NA	NA
67663	Chloroform	NA	NA	NA	7.92E+06	N/A	NA	NA
156592	cis-1,2-Dichloroethylene	NA	NA	NA	3.50E+06	N/A	NA	3.8E-04
110827	Cyclohexane	NA	NA	NA	5.50E+04	N/A	NA	NA
100414	Ethylbenzene	NA	NA	NA	1.69E+05	N/A	NA	NA
98828	Isopropylbenzene	NA	NA	NA	5.60E+04	N/A	NA	NA
108872	Methyl cyclohexane	NA	NA	NA	1.40E+04	N/A	NA	NA
1634044	Methyl-Tertiary-Butyl Ether	NA	NA	NA	5.10E+07	N/A	NA	NA
75092	Methylene chloride	NA	NA	NA	1.30E+07	N/A	NA	NA
127184	Tetrachloroethylene	NA	NA	NA	2.00E+05	N/A	7.7E-09	NA
108883	Toluene	NA	NA	NA	5.26E+05	N/A	NA	NA
156605	trans-1,2-Dichloroethylene	NA	NA	NA	6.30E+06	N/A	NA	NA
79016	Trichloroethylene	NA	NA	NA	1.10E+06	N/A	5.4E-06	1.4E-02
75014	Vinyl chloride	NA	NA	NA	2.76E+06	N/A	1.6E-08	2.1E-04
1330207	Xylenes	NA	NA	NA	2.20E+05	N/A	NA	NA
98862	Acetophenone	NA	NA	NA	6.13E+06	N/A	NA	NA
91203	Naphthalene	NA	NA	NA	3.10E+04	N/A	NA	6.5E-04
91576	Methylnaphthalene, 2-	NA	NA	NA	2.46E+04	N/A	NA	NA
92524	Biphenyl, 1,1'-	NA	NA	NA	6.94E+03	N/A	NA	NA
208968	Acenaphthylene	NA	NA	NA	3.93E+03	N/A	NA	NA
83329	Acenaphthene	NA	NA	NA	4.24E+03	N/A	NA	NA
86737	Fluorene	NA	NA	NA	1.90E+03	N/A	NA	NA
85018	Phenanthrene	NA	NA	NA	1.28E+03	N/A	NA	3.6E-04
120127	Anthracene	NA	NA	NA	4.34E+01	N/A	NA	NA
C9-C18	C9-C18 Aliphatics	NA	NA	NA	1.00E+04	N/A	NA	NA
C11-C22	C11-C22 Aromatics	NA	NA	NA	5.80E+06	N/A	NA	NA
C5-C8	C5-C8 Aliphatics	NA	NA	NA	1.10E+07	N/A	NA	NA
C9-C10	C9-C10 Aromatics	NA	NA	NA	5.10E+07	N/A	NA	NA
C9-C12	C9-C12 Aliphatics	NA	NA	NA	7.00E+04	N/A	NA	NA

	95% UCL Cancer Risk	95% UCL HI
TOTAL:	5E-06	2E-02

[ ] = Cancer risk > 1E-05 or HQ/HI>1E+00

END

Appendix C.4
Johnson & Ettinger Model - Data Entry Screen
Inhalation of Volatiles from Groundwater
Future Child Resident Scenario - CT
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Aberjona Auto Parts

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	Chemical	Enter Initial groundwater conc., C_w (µg/L)	ENTER 95% UCL groundwater conc., C_w (µg/L)	ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, LWT (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR Note	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Exposure time ET (hrs/day)	ENTER Conversion factor CF (hr/yr)
71556	1,1,1-Trichloroethane			52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
76131	Trichloro-1,2,2-trifluoroethane, 1,1,2-			52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
79005	1,1,2-Trichloroethane			52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
75343	1,1-Dichloroethane			52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
75354	1,1-Dichloroethylene	1.17E-01		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
120821	1,2,4-Trichlorobenzene			52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
95501	1,2-Dichlorobenzene			52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
541731	Dichlorobenzene, 1,3-			52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
106467	1,4-Dichlorobenzene	4.30E-01		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
78933	Butanone, 2- (MEK)			52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
67641	Acetone			52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
71432	Benzene	7.60E-02		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
74839	Bromomethane			52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
75150	Carbon Disulfide			52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
108907	Chlorobenzene			52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
75003	Ethyl Chloride			52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
67663	Chloroform			52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
156592	cis-1,2-Dichloroethylene	6.00E+00		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
110827	Cyclohexane			52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
100414	Ethylbenzene			52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
98828	Isopropylbenzene			52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
108872	Methyl cyclohexane			52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
1634044	Methyl-Tertiary-Butyl Ether			52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
75092	Methylene chloride			52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
127184	Tetrachloroethylene	4.18E-01		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
108883	Toluene			52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
156605	trans-1,2-Dichloroethylene			52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
79016	Trichloroethylene	2.15E+01		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
75014	Vinyl chloride	1.97E-01		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
1330207	Xylenes			52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
98862	Acetophenone			52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
91203	Naphthalene	1.35E+00		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
91576	Methylnaphthalene, 2-			52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
92524	Biphenyl, 1,1-			52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
208968	Acenaphthylene			52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
83329	Acenaphthene			52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
86737	Fluorene			52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
85018	Phenanthrene	2.10E+00		52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
120127	Anthracene			52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
C9-C18	C9-C18 Aliphatics			52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
C11-C22	C11-C22 Aromatics			52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
C5-C8	C5-C8 Aliphatics			52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
C9-C10	C9-C10 Aromatics			52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760
C9-C12	C9-C12 Aliphatics			52.12	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	350	16	8760

Note:
1) Default soil parameters from table 7 of User's Guide for Evaluating Subsurface Vapor Intrusion into Building (U.S. EPA June 19, 2003) were used for soil water filled porosity (θ_w), soil organic carbon fraction (f_{oc}), soil total porosity (n), and soil dry bulk density (ρ_b).

Appendix C.4
Johnson & Ettinger Model - Chemical Properties Screen
Inhalation of Volatiles from Groundwater
Future Child Resident Scenario - CT
Southwest Prperties, Wells G&H Superfund Site, Operable Unit 2
Aberjona Auto Parts

Chemical CAS No.	Chemical	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
71556	1,1,1-Trichloroethane	7.80E-02	8.80E-06	1.72E-02	25	7,136	347.24	545.00	1.10E+02	1.33E+03	N/A	2.2E+00
76131	Trichloro-1,2,2-triflouroethane, 1,	2.88E-02	8.07E-06	5.17E-01	25	1,326	320.70	481.05	2.25E+02	1.70E+02	N/A	3.0E+01
79005	1,1,2-Trichloroethane	7.80E-02	8.80E-06	9.12E-04	25	8,322	386.15	602.00	5.01E+01	4.42E+03	1.6E-05	2.2E+00
75343	1,1-Dichloroethane	7.42E-02	1.05E-05	5.61E-03	25	6,895	330.55	523.00	3.16E+01	5.06E+03	N/A	5.0E-01
75354	1,1-Dichloroethylene	9.00E-02	1.04E-05	2.61E-02	25	6,247	304.75	576.05	5.89E+01	2.25E+03	N/A	2.0E-01
120821	1,2,4-Trichlorobenzene	3.00E-02	8.23E-06	1.42E-03	25	10,471	486.15	725.00	1.78E+03	3.00E+02	N/A	2.0E-01
95501	1,2-Dichlorobenzene	6.88E-02	9.41E-06	1.62E-06	25	1,223	465.00	697.50	5.34E+01	2.77E+04	N/A	N/A
541731	Dichlorobenzene, 1,3-	4.14E-02	8.85E-06	4.70E-03	25	1,242	446.00	683.96	1.70E+02	6.88E+01	N/A	N/A
106467	1,4-Dichlorobenzene	6.90E-02	7.90E-06	2.43E-03	25	9,271	447.21	684.75	6.17E+02	7.38E+01	N/A	8.0E-01
78933	Butanone, 2- (MEK)	8.08E-02	9.80E-06	5.60E-05	25	1,311	352.50	528.75	3.83E+00	2.23E+05	N/A	N/A
67641	Acetone	1.24E-01	1.14E-05	3.88E-05	25	6,955	329.20	508.10	5.75E-01	1.00E+06	N/A	N/A
71432	Benzene	8.80E-02	9.80E-06	5.56E-03	25	7,342	353.24	562.16	5.89E+01	1.75E+03	7.8E-06	3.0E-02
74839	Bromomethane	7.28E-02	1.21E-05	6.22E-03	25	1,362	276.50	414.75	1.43E+01	1.52E+04	N/A	5.0E-03
75150	Carbon Disulfide	1.04E-01	1.29E-05	1.27E-02	25	6,391	319.00	552.00	5.14E+01	2.67E+03	N/A	7.0E-01
108907	Chlorobenzene	7.30E-02	8.70E-06	3.71E-03	25	8,410	404.87	632.40	2.19E+02	4.72E+02	N/A	6.0E-02
75003	Ethyl Chloride	1.26E-01	6.50E-06	8.67E-03	25	1,355	249.00	373.50	1.43E+01	5.32E+03	N/A	1.0E+01
67663	Chloroform	1.04E-01	1.00E-05	3.66E-03	25	6,988	334.32	536.40	3.98E+01	7.92E+03	2.3E-05	5.0E-02
156592	cis-1,2-Dichloroethylene	7.36E-02	1.13E-05	4.07E-03	25	7,192	333.65	544.00	3.55E+01	3.50E+03	N/A	2.0E-01
110827	Cyclohexane	8.00E-02	9.00E-06	2.00E+00	25	1,309	353.85	530.78	1.60E+02	5.50E+01	#N/A	#N/A
100414	Ethylbenzene	7.50E-02	7.80E-06	7.88E-03	25	8,501	409.34	617.20	3.63E+02	1.69E+02	N/A	1.0E+00
98828	Isopropylbenzene	6.50E-02	7.83E-06	1.47E-02	25	1,259	425.40	631.01	9.31E+03	5.60E+01	N/A	4.0E-01
108872	Methyl cyclohexane	9.86E-02	8.52E-06	4.23E-01	25	1,296	373.90	560.85	2.68E+02	1.40E+01	N/A	3.0E+00
1634044	Methyl-Tertiary-Butyl Ether	1.02E-01	1.05E-05	5.87E-04	25	1,324	328.36	497.11	3.84E+01	5.10E+04	N/A	3.0E+00
75092	Methylene chloride	1.01E-01	1.17E-05	2.19E-03	25	6,706	313.00	510.00	1.17E+01	1.30E+04	4.7E-07	3.0E+00
127184	Tetrachloroethylene	7.20E-02	8.20E-06	1.84E-02	25	8,288	394.40	620.20	1.55E+02	2.00E+02	5.9E-06	N/A
108883	Toluene	8.70E-02	8.60E-06	6.63E-03	25	7,930	383.78	591.79	1.82E+02	5.26E+02	N/A	4.0E-01
156605	trans-1,2-Dichloroethylene	7.07E-02	1.19E-05	9.39E-03	25	1,333	320.85	516.50	5.25E+01	6.30E+03	N/A	2.0E-01
79016	Trichloroethylene	7.90E-02	9.10E-06	1.03E-02	25	7,505	360.36	544.20	1.66E+02	1.10E+03	N/A	4.0E-02
75014	Vinyl chloride	1.06E-01	1.23E-05	2.71E-02	25	5,250	259.25	432.00	1.86E+01	2.76E+03	8.8E-06	1.0E-01
1330207	Xylenes	7.69E-02	8.44E-06	6.73E-06	25	1,264	417.40	616.21	2.41E+02	2.20E+02	N/A	1.0E-01
98862	Acetophenone	6.00E-02	8.73E-06	1.02E-05	25	1,214	475.00	712.50	4.62E+01	6.13E+03	N/A	N/A
91203	Naphthalene	5.90E-02	7.50E-06	4.83E-04	25	10,373	491.14	748.40	2.00E+03	3.10E+01	N/A	3.0E-03
91576	Methylnaphthalene, 2-	4.84E-02	7.75E-06	1.01E-03	25	1,169	514.05	761.01	8.51E+03	2.46E+01	N/A	3.0E-03
92524	Biphenyl, 1,1'-	4.04E-02	8.15E-06	3.03E-04	25	1,149	529.10	793.65	6.25E+03	6.94E+00	N/A	N/A
208968	Acenaphthylene	4.43E-02	7.44E-06	2.80E-04	25	1,118	553.00	792.01	4.79E+03	3.93E+00	N/A	3.0E-03
83329	Acenaphthene	4.21E-02	7.69E-06	1.55E-04	25	12,155	550.54	803.15	7.08E+03	4.24E+00	N/A	3.0E-03
86737	Fluorene	3.63E-02	7.88E-06	9.41E-08	25	12,666	570.44	870.00	7.71E+03	1.90E+00	N/A	3.0E-03
85018	Phenanthrene	3.30E-02	7.47E-06	1.30E-04	25	1,057	613.00	869.01	1.41E+04	1.28E+00	N/A	3.0E-03
120127	Anthracene	3.24E-02	7.74E-06	6.51E-05	25	13,121	615.18	873.00	2.95E+04	4.34E-02	N/A	3.0E-03
C9-C18	C9-C18 Aliphatics	6.00E-02	1.00E-05	1.66E+00	25	NA	NA	NA	6.80E+05	1.00E+01	N/A	2.0E-01
C11-C22	C11-C22 Aromatics	6.00E-02	1.00E-05	7.32E-04	25	NA	NA	NA	5.00E+03	5.80E+03	N/A	5.0E-02
C5-C8	C5-C8 Aliphatics	6.00E-02	1.00E-05	1.30E+00	25	NA	NA	NA	2.27E+03	1.10E+04	N/A	2.0E-01
C9-C10	C9-C10 Aromatics	6.00E-02	1.00E-05	7.92E-03	25	NA	NA	NA	1.78E+03	5.10E+04	N/A	5.0E-02
C9-C12	C9-C12 Aliphatics	6.00E-02	1.00E-05	1.56E+00	25	NA	NA	NA	1.50E+05	7.00E+01	N/A	2.0E-01

Appendix C 4
Johnson & Ettinger Model - Calculations Screen
Inhalation of Volatiles from Groundwater
Future Child Resident Scenario - CT
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Aberjona Auto Parts

		Source-building separation, L_s (cm)	Vadose zone soil air-filled porosity, θ_a^v (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{we} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, θ_{acz} (cm^3/cm^3)	Water-filled porosity in capillary zone, θ_{wcz} (cm^3/cm^3)	Floor-wall seam perimeter, Xcrack (cm)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} ($atm-m^3/mol$)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)
71556	1,1,1-Trichloroethane	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	7,885	8.50E-03	3.86E-01
76131	Trichloro-1,2,2-trifluoroethane, 1,1,2-	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	1,438	4.55E-01	1.96E+01
79005	1,1,2-Trichloroethane	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	9,572	3.86E-04	1.67E-02
75343	1,1-Dichloroethane	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	7,450	2.88E-03	1.24E-01
75354	1,1-Dichloroethylene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	6,392	1.47E-02	6.34E-01
120821	1,2,4-Trichlorobenzene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	13,230	4.35E-04	1.87E-02
95501	1,2-Dichlorobenzene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	1,521	1.41E-06	6.09E-05
541731	Dichlorobenzene, 1,3-	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	1,503	4.11E-03	1.77E-01
106467	1,4-Dichlorobenzene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	11,243	8.88E-04	3.83E-02
78933	Butanone, 2- (MEK)	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	1,486	4.90E-05	2.11E-03
67641	Acetone	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	7,559	1.97E-05	8.50E-04
71432	Benzene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	8,122	2.69E-03	1.16E-01
74839	Bromomethane	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	1,337	5.52E-03	2.38E-01
75150	Carbon Disulfide	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	6,682	6.99E-03	3.01E-01
108907	Chlorobenzene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	8,803	1.54E-03	6.65E-02
75003	Ethyl Chloride	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	1,201	7.79E-03	3.35E-01
67663	Chloroform	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	7,554	1.86E-03	8.02E-02
156592	cis-1,2-Dichloroethylene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	7,734	2.04E-03	8.77E-02
110827	Cyclohexene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	1,488	1.75E+00	7.54E+01
100414	Ethylbenzene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	10,155	3.18E-03	1.37E-01
98828	Isopropylbenzene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	1,940	1.28E-02	5.51E-01
108872	Methyl cyclohexane	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	1,505	3.70E-01	1.59E+01
1634044	Methyl-Tertiary-Butyl Ether	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	1,447	5.16E-04	2.22E-02
75092	Methylene chloride	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	7,034	1.17E-03	5.03E-02
127184	Tetrachloroethylene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	9,553	7.83E-03	3.37E-01
108883	Toluene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	9,154	2.92E-03	1.26E-01
156605	trans-1,2-Dichloroethylene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	1,417	8.27E-03	3.56E-01
79016	Trichloroethylene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	8,557	4.79E-03	2.06E-01
75014	Vinyl chloride	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	5,000	1.73E-02	7.46E-01
1330207	Xylenes	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	1,542	5.96E-06	2.52E-04
98862	Acetophenone	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	1,518	8.91E-05	3.83E-03
91203	Naphthalene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	12,913	1.52E-04	6.55E-03
91576	Methylnaphthalene, 2-	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	1,506	8.86E-04	3.81E-02
92524	Biphenyl, 1,1-	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	1,472	2.66E-04	1.14E-02
208968	Acenaphthylene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	1,513	2.45E-04	1.05E-02
83329	Acenaphthene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	16,123	3.67E-05	1.58E-03
86737	Fluorene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	16,235	2.20E-06	9.48E-05
85018	Phenanthrene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	1,479	1.14E-04	4.90E-03
120127	Anthracene	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	16,353	1.26E-05	5.43E-04
C9-C18	C9-C18 Aliphatics	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	NA	8.28E-01	3.56E+01
C11-C22	C11-C22 Aromatics	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	NA	3.60E-04	1.55E-02
C5-C8	C5-C8 Aliphatics	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	NA	6.48E-01	2.79E+01
C9-C10	C9-C10 Aromatics	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	NA	3.96E-03	1.70E-01
C9-C12	C9-C12 Aliphatics	30.48	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	4.00E+03	2.54E+04	1.80E+06	2.22E-04	52.12	NA	7.80E-01	3.36E+01

Appendix C.4
Johnson & Ettinger Model - Calculations Screen
Inhalation of Volatiles from Groundwater
Future Child Resident Scenario - CT
Southwest Properties, Wells G&H Superfund Site, Oper-
Aberjona Auto Parts

		Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_v (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
71556	1,1,1-Trichloroethane	1.75E-04	4.75E-04	4.45E-04	4.56E-04	30.48	52.12	N/A	0.10	5.22E+00	4.75E-04	4.00E+02	1.44E+179	1.72E-04	N/A	N/A	2.2E+00
76131	Trichloro-1,2,2-trifluoroethane, 1,1,2-	1.75E-04	1.75E-04	1.63E-04	1.67E-04	30.48	52.12	N/A	0.10	5.22E+00	1.75E-04	4.00E+02	#NUM!	1.35E-04	N/A	N/A	3.0E+01
79005	1,1,2-Trichloroethane	1.75E-04	5.24E-04	4.95E-04	5.06E-04	30.48	52.12	N/A	0.10	5.22E+00	5.24E-04	4.00E+02	1.89E+162	1.75E-04	N/A	1.6E-05	2.2E+00
75343	1,1-Dichloroethane	1.75E-04	4.58E-04	4.29E-04	4.40E-04	30.48	52.12	N/A	0.10	5.22E+00	4.58E-04	4.00E+02	6.94E+165	1.71E-04	N/A	N/A	5.0E-01
75354	1,1-Dichloroethylene	1.75E-04	5.47E-04	5.12E-04	5.25E-04	30.48	52.12	7.42E+01	0.10	5.22E+00	5.47E-04	4.00E+02	3.87E+155	1.76E-04	1.31E-02	N/A	2.0E-01
120821	1,2,4-Trichlorobenzene	1.75E-04	2.25E-04	2.14E-04	2.18E-04	30.48	52.12	N/A	0.10	5.22E+00	2.25E-04	4.00E+02	#NUM!	1.46E-04	N/A	N/A	2.0E-01
95501	1,2-Dichlorobenzene	1.75E-04	1.56E-02	1.60E-02	1.58E-02	30.48	52.12	N/A	0.10	5.22E+00	1.56E-02	4.00E+02	2.87E+05	2.04E-04	N/A	N/A	N/A
541731	Dichlorobenzene, 1,3-	1.75E-04	2.56E-04	2.40E-04	2.46E-04	30.48	52.12	N/A	0.10	5.22E+00	2.56E-04	4.00E+02	#NUM!	1.51E-04	N/A	N/A	N/A
106467	1,4-Dichlorobenzene	1.75E-04	4.38E-04	4.12E-04	4.22E-04	30.48	52.12	1.64E+01	0.10	5.22E+00	4.38E-04	4.00E+02	1.36E+194	1.70E-04	2.79E-03	N/A	8.0E-01
78933	Butanone, 2- (MEK)	1.75E-04	9.45E-04	9.27E-04	9.34E-04	30.48	52.12	N/A	0.10	5.22E+00	9.45E-04	4.00E+02	1.05E+90	1.66E-04	N/A	N/A	N/A
67641	Acetone	1.75E-04	2.07E-03	2.06E-03	2.06E-03	30.48	52.12	N/A	0.10	5.22E+00	2.07E-03	4.00E+02	1.40E+41	1.97E-04	N/A	N/A	N/A
71432	Benzene	1.75E-04	5.42E-04	5.07E-04	5.20E-04	30.48	52.12	6.66E+00	0.10	5.22E+00	5.42E-04	4.00E+02	1.40E+157	1.76E-04	1.53E-03	7.8E-06	3.0E-02
74839	Bromomethane	1.75E-04	4.46E-04	4.18E-04	4.29E-04	30.48	52.12	N/A	0.10	5.22E+00	4.46E-04	4.00E+02	5.67E+190	1.70E-04	N/A	N/A	5.0E-03
75150	Carbon Disulfide	1.75E-04	6.34E-04	5.94E-04	6.09E-04	30.48	52.12	N/A	0.10	5.22E+00	6.34E-04	4.00E+02	1.39E+134	1.79E-04	N/A	N/A	7.0E-01
108907	Chlorobenzene	1.75E-04	4.55E-04	4.27E-04	4.37E-04	30.48	52.12	N/A	0.10	5.22E+00	4.55E-04	4.00E+02	9.06E+186	1.71E-04	N/A	N/A	6.0E-02
75003	Ethyl Chloride	1.75E-04	7.66E-04	7.16E-04	7.34E-04	30.48	52.12	N/A	0.10	5.22E+00	7.66E-04	4.00E+02	1.53E+111	1.83E-04	N/A	N/A	1.0E+01
67663	Chloroform	1.75E-04	6.43E-04	5.02E-04	6.17E-04	30.48	52.12	N/A	0.10	5.22E+00	6.43E-04	4.00E+02	2.93E+132	1.80E-04	N/A	2.3E-05	5.0E-02
156592	cis-1,2-Dichloroethylene	1.75E-04	4.59E-04	4.30E-04	4.41E-04	30.48	52.12	7.02E+02	0.10	5.22E+00	4.59E-04	4.00E+02	3.62E+185	1.71E-04	1.20E-01	N/A	2.0E-01
110827	Cyclohexane	1.75E-04	4.85E-04	4.53E-04	4.65E-04	30.48	52.12	N/A	0.10	5.22E+00	4.85E-04	4.00E+02	3.54E+175	1.73E-04	N/A	#N/A	#N/A
100414	Ethylbenzene	1.75E-04	4.60E-04	4.31E-04	4.42E-04	30.48	52.12	N/A	0.10	5.22E+00	4.60E-04	4.00E+02	9.52E+184	1.71E-04	N/A	N/A	1.0E+00
98828	Isopropylbenzene	1.75E-04	3.95E-04	3.70E-04	3.79E-04	30.48	52.12	N/A	0.10	5.22E+00	3.95E-04	4.00E+02	2.06E+215	1.67E-04	N/A	N/A	4.0E-01
108872	Methyl cyclohexane	1.75E-04	5.98E-04	5.59E-04	5.73E-04	30.48	52.12	N/A	0.10	5.22E+00	5.98E-04	4.00E+02	2.65E+142	1.78E-04	N/A	N/A	3.0E+00
1634044	Methyl-Tertiary-Butyl Ether	1.75E-04	6.67E-04	6.25E-04	6.43E-04	30.48	52.12	N/A	0.10	5.22E+00	6.67E-04	4.00E+02	4.02E+127	1.81E-04	N/A	N/A	3.0E+00
75092	Methylene chloride	1.75E-04	6.35E-04	5.96E-04	6.10E-04	30.48	52.12	N/A	0.10	5.22E+00	6.35E-04	4.00E+02	1.12E+134	1.80E-04	N/A	4.7E-07	3.0E+00
127184	Tetrachloroethylene	1.75E-04	4.39E-04	4.11E-04	4.21E-04	30.48	52.12	1.41E+02	0.10	5.22E+00	4.39E-04	4.00E+02	9.93E+193	1.70E-04	2.39E-02	5.9E-06	N/A
108883	Toluene	1.75E-04	5.34E-04	5.00E-04	5.13E-04	30.48	52.12	N/A	0.10	5.22E+00	5.34E-04	4.00E+02	2.51E+159	1.75E-04	N/A	N/A	4.0E-01
156605	trans-1,2-Dichloroethylene	1.75E-04	4.32E-04	4.04E-04	4.14E-04	30.48	52.12	N/A	0.10	5.22E+00	4.32E-04	4.00E+02	1.37E+197	1.69E-04	N/A	N/A	2.0E-01
79016	Trichloroethylene	1.75E-04	4.83E-04	4.52E-04	4.64E-04	30.48	52.12	4.43E+03	0.10	5.22E+00	4.83E-04	4.00E+02	1.62E+176	1.73E-04	7.66E-01	N/A	4.0E-02
75014	Vinyl chloride	1.75E-04	6.44E-04	6.02E-04	6.18E-04	30.48	52.12	1.47E+02	0.10	5.22E+00	6.44E-04	4.00E+02	1.44E+132	1.80E-04	2.64E-02	8.8E-06	1.0E-01
1330207	Xylenes	1.75E-04	3.75E-03	3.81E-03	3.79E-03	30.48	52.12	N/A	0.10	5.22E+00	3.75E-03	4.00E+02	5.06E+22	2.01E-04	N/A	N/A	1.0E-01
98862	Acetophenone	1.75E-04	2.60E-03	2.64E-03	2.62E-03	30.48	52.12	N/A	0.10	5.22E+00	2.60E-03	4.00E+02	5.59E+32	1.99E-04	N/A	N/A	N/A
91203	Naphthalene	1.75E-04	4.70E-04	4.50E-04	4.57E-04	30.48	52.12	8.86E+00	0.10	5.22E+00	4.70E-04	4.00E+02	1.34E+181	1.72E-04	1.53E-03	N/A	3.0E-03
91576	Methylnaphthalene, 2-	1.75E-04	3.13E-04	2.85E-04	3.02E-04	30.48	52.12	N/A	0.10	5.22E+00	3.13E-04	4.00E+02	4.83E+271	1.59E-04	N/A	N/A	3.0E-03
92524	Biphenyl, 1,1'-	1.75E-04	3.15E-04	3.01E-04	3.06E-04	30.48	52.12	N/A	0.10	5.22E+00	3.15E-04	4.00E+02	2.33E+270	1.59E-04	N/A	N/A	N/A
208968	Acenaphthylene	1.75E-04	3.36E-04	3.22E-04	3.28E-04	30.48	52.12	N/A	0.10	5.22E+00	3.36E-04	4.00E+02	1.29E+252	1.62E-04	N/A	N/A	3.0E-03
83329	Acenaphthene	1.75E-04	7.33E-04	7.31E-04	7.32E-04	30.48	52.12	N/A	0.10	5.22E+00	7.33E-04	4.00E+02	1.12E+115	1.83E-04	N/A	N/A	3.0E-03
86737	Fluorene	1.75E-04	8.16E-01	8.39E-01	8.30E-01	30.48	52.12	N/A	0.10	5.22E+00	8.16E-01	4.00E+02	1.27E+00	9.61E-04	N/A	N/A	3.0E-03
85018	Phenanthrene	1.75E-04	3.50E-04	3.41E-04	3.44E-04	30.48	52.12	1.03E+01	0.10	5.22E+00	3.50E-04	4.00E+02	3.05E+243	1.64E-04	1.68E-03	N/A	3.0E-03
120127	Anthracene	1.75E-04	1.60E-03	1.62E-03	1.61E-03	30.48	52.12	N/A	0.10	5.22E+00	1.60E-03	4.00E+02	2.22E+53	1.95E-04	N/A	N/A	3.0E-03
C9-C18	C9-C18 Aliphatics	1.75E-04	3.64E-04	3.40E-04	3.49E-04	30.48	52.12	N/A	0.10	5.22E+00	3.64E-04	4.00E+02	1.13E+234	1.64E-04	N/A	N/A	2.0E-01
C11-C22	C11-C22 Aromatics	1.75E-04	4.27E-04	4.05E-04	4.13E-04	30.48	52.12	N/A	0.10	5.22E+00	4.27E-04	4.00E+02	2.20E+199	1.69E-04	N/A	N/A	5.0E-02
C5-C8	C5-C8 Aliphatics	1.75E-04	3.64E-04	3.40E-04	3.49E-04	30.48	52.12	N/A	0.10	5.22E+00	3.64E-04	4.00E+02	1.12E+234	1.64E-04	N/A	N/A	2.0E-01
C9-C10	C9-C10 Aromatics	1.75E-04	3.69E-04	3.46E-04	3.55E-04	30.48	52.12	N/A	0.10	5.22E+00	3.69E-04	4.00E+02	2.64E+230	1.65E-04	N/A	N/A	5.0E-02
C9-C12	C9-C12 Aliphatics	1.75E-04	3.64E-04	3.40E-04	3.49E-04	30.48	52.12	N/A	0.10	5.22E+00	3.64E-04	4.00E+02	1.13E+234	1.64E-04	N/A	N/A	2.0E-01

Appendix C.4
Johnson & Ettinger Model - Results
Inhalation of Volatiles from Groundwater
Future Child Resident Scenario - CT
Southwest Prperties, Wells G&H Superfund Site, Operable Unit 2
Aberjona Auto Parts

		RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:					INCREMENTAL RISK CALCULATIONS:	
		Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
71556	1,1,1-Trichloroethane	NA	NA	NA	1.33E+06	NA	NA	NA
76131	Trichloro-1,2,2-trifluoroethane, 1,1,2-	NA	NA	NA	1.70E+05	NA	NA	NA
79005	1,1,2-Trichloroethane	NA	NA	NA	4.42E+06	NA	NA	NA
75343	1,1-Dichloroethane	NA	NA	NA	5.06E+06	NA	NA	NA
75354	1,1-Dichloroethylene	NA	NA	NA	2.25E+06	NA	NA	4.2E-05
120821	1,2,4-Trichlorobenzene	NA	NA	NA	3.00E+05	NA	NA	NA
95501	1,2-Dichlorobenzene	NA	NA	NA	2.77E+07	NA	NA	NA
541731	Dichlorobenzene, 1,3-	NA	NA	NA	6.88E+04	NA	NA	NA
106467	1,4-Dichlorobenzene	NA	NA	NA	7.38E+04	NA	NA	2.2E-06
78933	Butanone, 2- (MEK)	NA	NA	NA	2.23E+08	NA	NA	NA
67641	Acetone	NA	NA	NA	1.00E+09	NA	NA	NA
71432	Benzene	NA	NA	NA	1.75E+06	NA	2.2E-10	3.2E-05
74839	Bromomethane	NA	NA	NA	1.52E+07	NA	NA	NA
75150	Carbon Disulfide	NA	NA	NA	2.67E+06	NA	NA	NA
108907	Chlorobenzene	NA	NA	NA	4.72E+05	NA	NA	NA
75003	Ethyl Chloride	NA	NA	NA	5.32E+06	NA	NA	NA
67663	Chloroform	NA	NA	NA	7.92E+06	NA	NA	NA
156592	cis-1,2-Dichloroethylene	NA	NA	NA	3.50E+06	NA	NA	3.8E-04
110827	Cyclohexane	NA	NA	NA	5.50E+04	NA	NA	NA
100414	Ethylbenzene	NA	NA	NA	1.69E+05	NA	NA	NA
98828	Isopropylbenzene	NA	NA	NA	5.60E+04	NA	NA	NA
108872	Methyl cyclohexane	NA	NA	NA	1.40E+04	NA	NA	NA
1634044	Methyl-Tertiary-Butyl Ether	NA	NA	NA	5.10E+07	NA	NA	NA
75092	Methylene chloride	NA	NA	NA	1.30E+07	NA	NA	NA
127184	Tetrachloroethylene	NA	NA	NA	2.00E+05	NA	2.6E-09	NA
108883	Toluene	NA	NA	NA	5.26E+05	NA	NA	NA
156605	trans-1,2-Dichloroethylene	NA	NA	NA	6.30E+06	NA	NA	NA
79016	Trichloroethylene	NA	NA	NA	1.10E+06	NA	NA	1.2E-02
75014	Vinyl chloride	NA	NA	NA	2.76E+06	NA	4.2E-09	1.7E-04
1330207	Xylenes	NA	NA	NA	2.20E+05	NA	NA	NA
98862	Acetophenone	NA	NA	NA	6.13E+06	NA	NA	NA
91203	Naphthalene	NA	NA	NA	3.10E+04	NA	NA	3.3E-04
91576	Methylnaphthalene, 2-	NA	NA	NA	2.46E+04	NA	NA	NA
92524	Biphenyl, 1,1'-	NA	NA	NA	6.94E+03	NA	NA	NA
208968	Acenaphthylene	NA	NA	NA	3.93E+03	NA	NA	NA
83329	Acenaphthene	NA	NA	NA	4.24E+03	NA	NA	NA
86737	Fluorene	NA	NA	NA	1.90E+03	NA	NA	NA
85018	Phenanthrene	NA	NA	NA	1.28E+03	NA	NA	3.6E-04
120127	Anthracene	NA	NA	NA	4.34E+01	NA	NA	NA
C9-C18	C9-C18 Aliphatics	NA	NA	NA	1.00E+04	NA	NA	NA
C11-C22	C11-C22 Aromatics	NA	NA	NA	5.80E+06	NA	NA	NA
C5-C8	C5-C8 Aliphatics	NA	NA	NA	1.10E+07	NA	NA	NA
C9-C10	C9-C10 Aromatics	NA	NA	NA	5.10E+07	NA	NA	NA
C9-C12	C9-C12 Aliphatics	NA	NA	NA	7.00E+04	NA	NA	NA

	95% UCL Cancer Risk	95% UCL HI
TOTAL:	7E-09	1E-02

[ ] = Cancer risk > 1E-05 or HQ/HI>1E+00

END

Appendix C.4

Johnson & Ettinger Model - Data Entry Screen
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - RME
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Whitmer Barrel

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	Chemical	ENTER 95% UCL groundwater conc., C_w (µg/L)	ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, LWT (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_s (°C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	Note	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone soil dry bulk density, ρ_b^v (g/cm^3)	ENTER Vadose zone soil total porosity, n^v (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^v (cm^3/cm^3)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_c (yrs)	ENTER Averaging time for noncarcinogens, AT_{nc} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Exposure time ET (hr/day)	ENTER Coversion factor CF (hrs/yr)
71556	1,1,1-Trichloroethane	4.62E+00	15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
76131	Trichloro-1,2,2-trifluoroethane, 1,1,2-		15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
79005	1,1,2-Trichloroethane		15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
75343	1,1-Dichloroethane	1.20E+02	15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
75354	1,1-Dichloroethylene		15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
120821	1,2,4-Trichlorobenzene		15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
95501	1,2-Dichlorobenzene	7.45E+00	15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
541731	Dichlorobenzene, 1,3-	1.80E+01	15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
106467	1,4-Dichlorobenzene	1.97E+02	15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
78933	Butanone, 2- (MEK)		15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
67641	Acetone		15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
71432	Benzene	8.80E+01	15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
74839	Bromomethane		15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
75150	Carbon Disulfide		15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
108907	Chlorobenzene	1.80E+01	15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
75003	Ethyl Chloride		15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
67663	Chloroform		15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
156592	cis-1,2-Dichloroethylene	4.80E+02	15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
110827	Cyclohexane		15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
100414	Ethylbenzene	4.00E+01	15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
98828	Isopropylbenzene		15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
108872	Methyl cyclohexane		15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
1634044	Methyl-Tertiary-Butyl Ether	5.40E+02	15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
75092	Methylene chloride		15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
127184	Tetrachloroethylene		15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
108883	Toluene	1.20E+03	15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
156605	trans-1,2-Dichloroethylene	1.60E+01	15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
79016	Trichloroethylene	2.00E+00	15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
75014	Vinyl chloride	4.20E+02	15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
1330207	Xylenes		15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
98862	Acetophenone		15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
91203	Naphthalene	9.60E+00	15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
91576	Methylnaphthalene, 2-		15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
92524	Biphenyl, 1,1'-		15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
208968	Acenaphthylene	3.20E+00	15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
83329	Acenaphthene		15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
86737	Fluorene		15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
85018	Phenanthrene	3.10E+00	15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
120127	Anthracene		15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
C9-C18	C9-C18 Aliphatics	5.90E+01	15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
C11-C22	C11-C22 Aromatics		15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
C5-C8	C5-C8 Aliphatics	4.48E+02	15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
C9-C10	C9-C10 Aromatics		15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
C9-C12	C9-C12 Aliphatics	5.90E+01	15	74.96	LS	10	LS		1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760

Note:
1) Default soil parameters from table 7 of User's Guide for Evaluating Subsurface Vapor Intrusion into Building (U.S. EPA June 19, 2003) were used for soil water filled porosity (θ_w), soil organic carbon fraction (f_{oc}), soil total porosity (n), and soil dry bulk density (ρ_b).

Appendix C.4
Johnson & Ettinger Model - Chemical Properties Screen
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - RME
Southwest Prperties, Wells G&H Superfund Site, Operable Unit 2
Whitney Barrel

Chemical		Diffusivity in air, D_a	Diffusivity in water, D_w	Henry's law constant at reference temperature, H	Henry's law constant reference temperature, T_R	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$	Normal boiling point, T_B	Critical temperature, T_C	Organic carbon partition coefficient, K_{oc}	Pure component water solubility, S	Unit risk factor, URF	Reference conc., RfC
CAS No.	Chemical	(cm^2/s)	(cm^2/s)	(atm-m^3/mol)	(°C)	(cal/mol)	(°K)	(°K)	(cm^3/g)	(mg/L)	$(\mu g/m^3)^{-1}$	(mg/m^3)
71556	1,1,1-Trichloroethane	7.80E-02	8.80E-06	1.72E-02	25	7,136	347.24	545.00	1.10E+02	1.33E+03	N/A	2.2E+00
76131	Trichloro-1,2,2-triflouroethane, 1,	2.88E-02	8.07E-06	5.17E-01	25	1,326	320.70	481.05	2.25E+02	1.70E+02	N/A	3.0E+01
79005	1,1,2-Trichloroethane	7.80E-02	8.80E-06	9.12E-04	25	8,322	386.15	602.00	5.01E+01	4.42E+03	1.6E-05	2.2E+00
75343	1,1-Dichloroethane	7.42E-02	1.05E-05	5.61E-03	25	6,895	330.55	523.00	3.16E+01	5.06E+03	N/A	5.0E-01
75354	1,1-Dichloroethylene	9.00E-02	1.04E-05	2.61E-02	25	6,247	304.75	576.05	5.89E+01	2.25E+03	N/A	2.0E-01
120821	1,2,4-Trichlorobenzene	3.00E-02	8.23E-06	1.42E-03	25	10,471	486.15	725.00	1.78E+03	3.00E+02	N/A	2.0E-01
95501	1,2-Dichlorobenzene	6.88E-02	9.41E-06	1.62E-06	25	1,223	465.00	697.50	5.34E+01	2.77E+04	N/A	N/A
541731	Dichlorobenzene, 1,3-	4.14E-02	8.85E-06	4.70E-03	25	1,242	446.00	683.96	1.70E+02	6.88E+01	N/A	N/A
106467	1,4-Dichlorobenzene	6.90E-02	7.90E-06	2.43E-03	25	9,271	447.21	684.75	6.17E+02	7.38E+01	N/A	8.0E-01
78933	Butanone, 2- (MEK)	8.08E-02	9.80E-06	5.60E-05	25	1,311	352.50	528.75	3.83E+00	2.23E+05	N/A	N/A
67641	Acetone	1.24E-01	1.14E-05	3.88E-05	25	6,955	329.20	508.10	5.75E-01	1.00E+06	N/A	N/A
71432	Benzene	8.80E-02	9.80E-06	5.56E-03	25	7,342	353.24	562.16	5.89E+01	1.75E+03	7.8E-06	3.0E-02
74839	Bromomethane	7.28E-02	1.21E-05	6.22E-03	25	1,362	276.50	414.75	1.43E+01	1.52E+04	N/A	5.0E-03
75150	Carbon Disulfide	1.04E-01	1.29E-05	1.27E-02	25	6,391	319.00	552.00	5.14E+01	2.67E+03	N/A	7.0E-01
108907	Chlorobenzene	7.30E-02	8.70E-06	3.71E-03	25	8,410	404.87	632.40	2.19E+02	4.72E+02	N/A	6.0E-02
75003	Ethyl Chloride	1.26E-01	6.50E-06	8.67E-03	25	1,355	249.00	373.50	1.43E+01	5.32E+03	N/A	1.0E+01
67663	Chloroform	1.04E-01	1.00E-05	3.66E-03	25	6,988	334.32	536.40	3.98E+01	7.92E+03	2.3E-05	5.0E-02
156592	cis-1,2-Dichloroethylene	7.36E-02	1.13E-05	4.07E-03	25	7,192	333.65	544.00	3.55E+01	3.50E+03	N/A	2.0E-01
110827	Cyclohexane	8.00E-02	9.00E-06	2.00E+00	25	1,309	353.85	530.78	1.60E+02	5.50E+01	#N/A	#N/A
100414	Ethylbenzene	7.50E-02	7.80E-06	7.88E-03	25	8,501	409.34	617.20	3.63E+02	1.69E+02	N/A	1.0E+00
98828	Isopropylbenzene	6.50E-02	7.83E-06	1.47E-02	25	1,259	425.40	631.01	9.31E+03	5.60E+01	N/A	4.0E-01
108872	Methyl cyclohexane	9.86E-02	8.52E-06	4.23E-01	25	1,296	373.90	560.85	2.68E+02	1.40E+01	N/A	3.0E+00
1634044	Methyl-Tertiary-Butyl Ether	1.02E-01	1.05E-05	5.87E-04	25	1,324	328.36	497.11	3.84E+01	5.10E+04	N/A	3.0E+00
75092	Methylene chloride	1.01E-01	1.17E-05	2.19E-03	25	6,706	313.00	510.00	1.17E+01	1.30E+04	4.7E-07	3.0E+00
127184	Tetrachloroethylene	7.20E-02	8.20E-06	1.84E-02	25	8,288	394.40	620.20	1.55E+02	2.00E+02	5.9E-06	N/A
108883	Toluene	8.70E-02	8.60E-06	6.63E-03	25	7,930	383.78	591.79	1.82E+02	5.26E+02	N/A	4.0E-01
156605	trans-1,2-Dichloroethylene	7.07E-02	1.19E-05	9.39E-03	25	1,333	320.85	516.50	5.25E+01	6.30E+03	N/A	2.0E-01
79016	Trichloroethylene	7.90E-02	9.10E-06	1.03E-02	25	7,505	360.36	544.20	1.66E+02	1.10E+03	N/A	4.0E-02
75014	Vinyl chloride	1.06E-01	1.23E-05	2.71E-02	25	5,250	259.25	432.00	1.86E+01	2.76E+03	8.8E-06	1.0E-01
1330207	Xylenes	7.69E-02	8.44E-06	6.73E-06	25	1,264	417.40	616.21	2.41E+02	2.20E+02	N/A	1.0E-01
98862	Acetophenone	6.00E-02	6.73E-06	1.02E-05	25	1,214	475.00	712.50	4.62E+01	6.13E+03	N/A	N/A
91203	Naphthalene	5.90E-02	7.50E-06	4.83E-04	25	10,373	491.14	748.40	2.00E+03	3.10E+01	N/A	3.0E-03
91576	Methylnaphthalene, 2-	4.84E-02	7.75E-06	1.01E-03	25	1,169	514.05	761.01	8.51E+03	2.46E+01	N/A	3.0E-03
92524	Biphenyl, 1,1'-	4.04E-02	8.15E-06	3.03E-04	25	1,149	529.10	793.65	6.25E+03	6.94E+00	N/A	N/A
208968	Acenaphthylene	4.43E-02	7.44E-06	2.80E-04	25	1,118	553.00	792.01	4.79E+03	3.93E+00	N/A	3.0E-03
83329	Acenaphthene	4.21E-02	7.69E-06	1.55E-04	25	12,155	550.54	803.15	7.08E+03	4.24E+00	N/A	3.0E-03
86737	Fluorene	3.63E-02	7.88E-06	9.41E-08	25	12,666	570.44	870.00	7.71E+03	1.90E+00	N/A	3.0E-03
85018	Phenanthrene	3.30E-02	7.47E-06	1.30E-04	25	1,057	613.00	869.01	1.41E+04	1.28E+00	N/A	3.0E-03
120127	Anthracene	3.24E-02	7.74E-06	6.51E-05	25	13,121	615.18	873.00	2.95E+04	4.34E-02	N/A	3.0E-03
C9-C18	C9-C18 Aliphatics	6.00E-02	1.00E-05	1.66E+00	25	NA	NA	NA	6.80E+05	1.00E+01	N/A	2.0E-01
C11-C22	C11-C22 Aromatics	6.00E-02	1.00E-05	7.32E-04	25	NA	NA	NA	5.00E+03	5.80E+03	N/A	5.0E-02
C5-C8	C5-C8 Aliphatics	6.00E-02	1.00E-05	1.30E+00	25	NA	NA	NA	2.27E+03	1.10E+04	N/A	2.0E-01
C9-C10	C9-C10 Aromatics	6.00E-02	1.00E-05	7.92E-03	25	NA	NA	NA	1.78E+03	5.10E+04	N/A	5.0E-02
C9-C12	C9-C12 Aliphatics	6.00E-02	1.00E-05	1.56E+00	25	NA	NA	NA	1.50E+05	7.00E+01	N/A	2.0E-01

Appendix C.4
Johnson & Ettinger Model - Calculations Screen
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - RME
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Whitney Barrel

		Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^Y (cm^3/cm^3)	Vadose zone effective total fluid saturation, θ_w (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{g,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, Xcrack (cm)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} ($atm-m^3/mol$)	Henry's law constant at vs. groundwat temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)
71556	1,1,1-Trichloroethane	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	7,886	8.50E-03	3.66E-01	1.75E-04
76131	Trichloro-1,2,2-trifluoroethane, 1,1,2-	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1,406	4.66E-01	1.96E+01	1.76E-04
79005	1,1,2-Trichloroethane	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	9,572	3.66E-04	1.67E-02	1.75E-04
75343	1,1-Dichloroethane	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	7,450	2.86E-03	1.24E-01	1.75E-04
75354	1,1-Dichloroethylene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	6,392	1.47E-02	6.34E-01	1.75E-04
120821	1,2,4-Trichlorobenzene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	13,230	4.35E-04	1.87E-02	1.75E-04
95501	1,2-Dichlorobenzene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1,521	1.41E-06	6.09E-05	1.75E-04
541731	Dichlorobenzene, 1,3-	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1,521	1.41E-06	6.09E-05	1.75E-04
106467	1,4-Dichlorobenzene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1,303	4.11E-03	1.77E-01	1.75E-04
78933	Butanone, 2- (MEK)	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	11,243	8.88E-04	3.83E-02	1.75E-04
67641	Acetone	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1,486	4.90E-05	2.11E-03	1.75E-04
71432	Benzene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	7,599	1.97E-06	8.50E-04	1.75E-04
74839	Bromomethane	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	5,122	2.58E-03	1.11E-01	1.75E-04
75150	Carbon Disulfide	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1,337	5.52E-03	2.38E-01	1.75E-04
108907	Chlorobenzene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	6,662	6.99E-03	3.01E-01	1.75E-04
75003	Ethyl Chloride	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	9,803	1.54E-03	6.65E-02	1.75E-04
67663	Chloroform	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	7,201	7.79E-03	3.35E-01	1.75E-04
156592	cis-1,2-Dichloroethylene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	7,554	1.86E-03	8.02E-02	1.75E-04
110827	Cyclohexane	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	7,734	2.04E-03	8.77E-02	1.75E-04
100414	Ethylbenzene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1,486	1.75E+00	7.54E+01	1.75E-04
98828	Isopropylbenzene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	10,155	3.18E-03	1.37E-01	1.75E-04
108872	Methyl cyclohexane	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1,540	1.28E-02	5.51E-01	1.75E-04
1634044	Methyl-Tertiary-Butyl Ether	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1,505	3.70E-01	1.59E+01	1.75E-04
75092	Methylene chloride	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1,447	5.16E-04	2.22E-02	1.75E-04
127184	Tetrachloroethylene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	7,034	1.17E-03	5.01E-02	1.75E-04
108883	Toluene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	9,663	7.83E-03	3.37E-01	1.75E-04
156605	trans-1,2-Dichloroethylene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	9,164	2.92E-03	1.26E-01	1.75E-04
79016	Trichloroethylene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1,417	8.27E-03	3.56E-01	1.75E-04
75014	Vinyl chloride	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	8,557	4.79E-03	2.06E-01	1.75E-04
1330207	Xylenes	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	5,000	1.73E-02	7.46E-01	1.75E-04
98862	Acetophenone	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1,842	5.85E-06	2.52E-04	1.75E-04
91203	Naphthalene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1,518	8.91E-06	3.83E-04	1.75E-04
91576	Methylnaphthalene, 2-	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	12,913	1.52E-04	6.55E-03	1.75E-04
92524	Biphenyl, 1,1-	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1,806	5.86E-04	3.81E-02	1.75E-04
208968	Acenaphthylene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1,472	2.66E-04	1.14E-02	1.75E-04
83329	Acenaphthene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1,513	2.45E-04	1.05E-02	1.75E-04
86737	Fluorene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	16,123	3.67E-05	1.58E-03	1.75E-04
85018	Phenanthrene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	16,235	2.20E-06	9.48E-05	1.75E-04
120127	Anthracene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1,479	1.14E-04	4.90E-03	1.75E-04
C9-C18	C9-C18 Aliphatics	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	18,383	1.26E-05	5.43E-04	1.75E-04
C11-C22	C11-C22 Aromatics	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	NA	8.28E-01	3.56E+01	1.75E-04
C5-C8	C5-C8 Aliphatics	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	NA	3.60E-04	1.55E-02	1.75E-04
C9-C10	C9-C10 Aromatics	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	NA	6.48E-01	2.79E+01	1.75E-04
C9-C12	C9-C12 Aliphatics	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	NA	3.96E-03	1.70E-01	1.75E-04
																	NA	7.80E-01	3.36E+01	1.75E-04

Appendix C.4
Johnson & Ettinger Model - Calculations Screen
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - RME
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Whitney Barrel

		Vadose zone effective diffusion coefficient, D^{eff}_v (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_w (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_v (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
71556	1,1,1-Trichloroethane	4.75E-04	4.45E-04	4.65E-04	59.95	15	1.68E+03	0.10	2.74E+01	4.75E-04	1.23E+03	4.36E+304	7.92E-06	1.34E-02	N/A	2.2E+00
79131	Trichloro-1,2,2-trifluoroethane, 1,1,2-	1.75E-04	1.63E-04	1.71E-04	59.95	15	N/A	0.10	2.74E+01	1.75E-04	1.23E+03	#NUM!	5.40E-06	N/A	N/A	3.0E+01
79005	1,1,2-Trichloroethane	5.24E-04	4.96E-04	5.15E-04	59.95	15	N/A	0.10	2.74E+01	5.24E-04	1.23E+03	8.56E+275	8.14E-06	N/A	1.6E-05	2.2E+00
75343	1,1-Dichloroethane	4.55E-04	4.29E-04	4.49E-04	59.95	15	1.49E+04	0.10	2.74E+01	4.55E-04	1.23E+03	#NUM!	7.84E-06	1.17E-01	N/A	5.0E-01
75354	1,1-Dichloroethylene	5.47E-04	5.12E-04	5.36E-04	59.95	15	N/A	0.10	2.74E+01	5.47E-04	1.23E+03	3.62E+264	8.22E-06	N/A	N/A	2.0E-01
120821	1,2,4-Trichlorobenzene	2.25E-04	2.14E-04	2.22E-04	59.95	15	N/A	0.10	2.74E+01	2.25E-04	1.23E+03	#NUM!	6.10E-06	N/A	N/A	2.0E-01
95501	1,2-Dichlorobenzene	1.56E-02	1.60E-02	1.57E-02	59.95	15	4.52E-01	0.10	2.74E+01	1.56E-02	1.23E+03	1.91E+09	1.08E-05	4.96E-06	N/A	N/A
541731	Dichlorobenzene, 1,3-	2.56E-04	2.40E-04	2.51E-04	59.95	15	3.36E+03	0.10	2.74E+01	2.56E-04	1.23E+03	#NUM!	6.43E-06	2.15E-02	N/A	N/A
106467	1,4-Dichlorobenzene	4.38E-04	4.12E-04	4.30E-04	59.95	15	7.54E+03	0.10	2.74E+01	4.38E-04	1.23E+03	#NUM!	7.75E-06	5.84E-02	N/A	8.0E-01
78933	Butanone, 2- (MEK)	9.45E-04	9.27E-04	9.40E-04	59.95	15	N/A	0.10	2.74E+01	9.45E-04	1.23E+03	1.18E+153	9.18E-06	N/A	N/A	N/A
67641	Acetone	2.07E-03	2.06E-03	2.07E-03	59.95	15	N/A	0.10	2.74E+01	2.07E-03	1.23E+03	9.18E+89	1.00E-05	N/A	N/A	N/A
71432	Benzene	5.42E-04	5.07E-04	5.30E-04	59.95	15	9.95E+03	0.10	2.74E+01	5.42E-04	1.23E+03	1.61E+267	8.20E-06	8.15E-02	7.8E-06	3.0E-02
74839	Bromomethane	4.48E-04	4.18E-04	4.37E-04	59.95	15	N/A	0.10	2.74E+01	4.48E-04	1.23E+03	#NUM!	7.79E-06	N/A	N/A	5.0E-03
75150	Carbon Disulfide	6.34E-04	5.94E-04	6.21E-04	59.95	15	N/A	0.10	2.74E+01	6.34E-04	1.23E+03	1.25E+228	8.50E-06	N/A	N/A	7.0E-01
108907	Chlorobenzene	4.55E-04	4.27E-04	4.46E-04	59.95	15	1.20E+03	0.10	2.74E+01	4.55E-04	1.23E+03	#NUM!	7.83E-06	9.37E-03	N/A	6.0E-02
75003	Ethyl Chloride	7.66E-04	7.16E-04	7.49E-04	59.95	15	N/A	0.10	2.74E+01	7.66E-04	1.23E+03	1.14E+183	8.83E-06	N/A	N/A	1.0E+01
67663	Chloroform	6.43E-04	6.02E-04	6.29E-04	59.95	15	N/A	0.10	2.74E+01	6.43E-04	1.23E+03	1.75E+225	8.53E-06	N/A	2.3E-05	9.8E-02
156592	cis-1,2-Dichloroethylene	4.59E-04	4.30E-04	4.49E-04	59.95	15	4.21E+04	0.10	2.74E+01	4.59E-04	1.23E+03	#NUM!	7.85E-06	3.30E-01	N/A	2.0E-01
110827	Cyclohexane	4.85E-04	4.53E-04	4.75E-04	59.95	15	N/A	0.10	2.74E+01	4.85E-04	1.23E+03	3.16E+296	7.97E-06	N/A	#N/A	#N/A
100414	Ethylbenzene	4.80E-04	4.31E-04	4.51E-04	59.95	15	5.47E+03	0.10	2.74E+01	4.80E-04	1.23E+03	#NUM!	7.85E-06	4.30E-02	N/A	1.0E+00
98828	Isopropylbenzene	3.95E-04	3.70E-04	3.87E-04	59.95	15	N/A	0.10	2.74E+01	3.96E-04	1.23E+03	#NUM!	7.51E-06	N/A	N/A	4.0E-01
108872	Methyl cyclohexane	6.99E-04	6.56E-04	5.85E-04	59.95	15	N/A	0.10	2.74E+01	5.98E-04	1.23E+03	1.50E+242	8.39E-06	N/A	N/A	3.0E+00
1634044	Methyl-Tertiary-Butyl Ether	6.67E-04	6.26E-04	6.54E-04	59.95	15	1.20E+04	0.10	2.74E+01	6.67E-04	1.23E+03	9.48E+216	8.60E-06	1.03E-01	N/A	3.0E+00
75092	Methylene chloride	6.35E-04	5.96E-04	6.22E-04	59.95	15	N/A	0.10	2.74E+01	6.35E-04	1.23E+03	8.55E+227	8.51E-06	N/A	4.7E-07	3.0E+00
127184	Tetrachloroethylene	4.39E-04	4.11E-04	4.30E-04	59.95	15	N/A	0.10	2.74E+01	4.39E-04	1.23E+03	#NUM!	7.75E-06	N/A	5.9E-06	N/A
108883	Toluene	5.34E-04	5.00E-04	5.23E-04	59.95	15	1.51E+05	0.10	2.74E+01	5.34E-04	1.23E+03	1.10E+271	8.17E-06	1.23E+00	N/A	4.0E-01
156605	trans-1,2-Dichloroethylene	4.32E-04	4.04E-04	4.23E-04	59.95	15	5.34E+03	0.10	2.74E+01	4.32E-04	1.23E+03	#NUM!	7.71E-06	4.12E-02	N/A	2.0E-01
79016	Trichloroethylene	4.83E-04	4.52E-04	4.73E-04	59.95	15	4.13E+02	0.10	2.74E+01	4.83E-04	1.23E+03	3.77E+299	7.96E-06	3.29E-03	N/A	4.0E-02
75014	Vinyl chloride	6.44E-04	6.02E-04	6.30E-04	59.95	15	3.13E+05	0.10	2.74E+01	6.44E-04	1.23E+03	5.27E+234	8.63E-06	2.67E+00	8.8E-06	1.0E-01
1330207	Xylenes	3.75E-03	3.51E-03	3.77E-03	59.95	15	N/A	0.10	2.74E+01	3.75E-03	1.23E+03	4.03E+38	1.04E-05	N/A	N/A	1.0E-01
98862	Acetophenone	2.60E-03	2.64E-03	2.61E-03	59.95	15	N/A	0.10	2.74E+01	2.60E-03	1.23E+03	4.82E+55	1.02E-05	N/A	N/A	N/A
91203	Naphthalene	4.70E-04	4.50E-04	4.64E-04	59.95	15	6.29E+01	0.10	2.74E+01	4.70E-04	1.23E+03	9.57E+307	7.92E-06	4.98E-04	N/A	3.0E-03
91575	Methylnaphthalene, 2-	3.13E-04	2.95E-04	3.07E-04	59.95	15	N/A	0.10	2.74E+01	3.13E-04	1.23E+03	#NUM!	5.95E-06	N/A	N/A	3.0E-03
92524	Biphenyl, 1,1-	3.15E-04	3.01E-04	3.10E-04	59.95	15	N/A	0.10	2.74E+01	3.15E-04	1.23E+03	#NUM!	6.88E-06	N/A	N/A	N/A
208968	Acenaphthylene	3.38E-04	3.22E-04	3.33E-04	59.95	15	3.37E+01	0.10	2.74E+01	3.38E-04	1.23E+03	#NUM!	7.15E-06	2.41E-04	N/A	3.0E-03
83329	Acenaphthene	7.33E-04	7.31E-04	7.33E-04	59.95	15	N/A	0.10	2.74E+01	7.33E-04	1.23E+03	2.13E+197	8.75E-06	N/A	N/A	3.0E-03
86737	Fluorene	8.19E-01	8.39E-01	8.23E-01	59.95	15	N/A	0.10	2.74E+01	8.18E-01	1.23E+03	1.50E+00	3.24E-05	N/A	N/A	3.0E-03
85018	Phenanthrene	3.50E-04	3.41E-04	3.47E-04	59.95	15	1.52E+01	0.10	2.74E+01	3.50E-04	1.23E+03	#NUM!	7.35E-06	1.10E-04	N/A	3.0E-03
120127	Anthracene	1.60E-03	1.62E-03	1.60E-03	59.95	15	N/A	0.10	2.74E+01	1.60E-03	1.23E+03	5.14E+90	9.81E-06	N/A	N/A	3.0E-03
C9-C18	C9-C18 Aliphatics	3.64E-04	3.40E-04	3.56E-04	59.95	15	2.10E+06	0.10	2.74E+01	3.64E-04	1.23E+03	#NUM!	7.32E-06	1.54E+01	N/A	2.0E-01
C11-C22	C11-C22 Aromatics	4.27E-04	4.05E-04	4.20E-04	59.95	15	N/A	0.10	2.74E+01	4.27E-04	1.23E+03	#NUM!	7.70E-06	N/A	N/A	6.0E-02
C5-C8	C5-C8 Aliphatics	3.64E-04	3.40E-04	3.56E-04	59.95	15	1.25E+07	0.10	2.74E+01	3.64E-04	1.23E+03	#NUM!	7.32E-06	9.14E+01	N/A	2.0E-01
C9-C10	C9-C10 Aromatics	3.69E-04	3.46E-04	3.62E-04	59.95	15	N/A	0.10	2.74E+01	3.69E-04	1.23E+03	#NUM!	7.35E-06	N/A	N/A	5.0E-02
C9-C12	C9-C12 Aliphatics	3.64E-04	3.40E-04	3.56E-04	59.95	15	1.68E+06	0.10	2.74E+01	3.64E-04	1.23E+03	#NUM!	7.32E-06	1.23E+01	N/A	2.0E-01

Appendix C.4
Johnson & Ettinger Model - Results
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - RME
Southwest Prperties, Wells G&H Superfund Site, Operable Unit 2
Whitney Barrel

		RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:					INCREMENTAL RISK CALCULATIONS:	
		Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
71556	1,1,1-Trichloroethane	NA	NA	NA	1.33E+06	NA	NA	1.4E-07
76131	Trichloro-1,2,2-trifluorouethane, 1,1,2-	NA	NA	NA	1.70E+05	NA	NA	NA
79005	1,1,2-Trichloroethane	NA	NA	NA	4.42E+06	NA	NA	NA
75343	1,1-Dichloroethane	NA	NA	NA	5.06E+06	NA	NA	5.2E-06
75354	1,1-Dichloroethylene	NA	NA	NA	2.25E+06	NA	NA	NA
120821	1,2,4-Trichlorobenzene	NA	NA	NA	3.00E+05	NA	NA	NA
95501	1,2-Dichlorobenzene	NA	NA	NA	2.77E+07	NA	NA	NA
541731	Dichlorobenzene, 1,3-	NA	NA	NA	6.88E+04	NA	NA	NA
106467	1,4-Dichlorobenzene	NA	NA	NA	7.38E+04	NA	NA	1.6E-06
78933	Butanone, 2- (MEK)	NA	NA	NA	2.23E+08	NA	NA	NA
67641	Acetone	NA	NA	NA	1.00E+09	NA	NA	NA
71432	Benzene	NA	NA	NA	1.75E+06	NA	1.2E-09	6.1E-05
74839	Bromomethane	NA	NA	NA	1.52E+07	NA	NA	NA
75150	Carbon Disulfide	NA	NA	NA	2.67E+06	NA	NA	NA
108907	Chlorobenzene	NA	NA	NA	4.72E+05	NA	NA	3.5E-06
75003	Ethyl Chloride	NA	NA	NA	5.32E+06	NA	NA	NA
67663	Chloroform	NA	NA	NA	7.92E+06	NA	NA	NA
156592	cis-1,2-Dichloroethylene	NA	NA	NA	3.50E+06	NA	NA	3.7E-05
110827	Cyclohexane	NA	NA	NA	5.50E+04	NA	NA	NA
100414	Ethylbenzene	NA	NA	NA	1.69E+05	NA	NA	9.6E-07
98828	Isopropylbenzene	NA	NA	NA	5.60E+04	NA	NA	NA
08872	Methyl cyclohexane	NA	NA	NA	1.40E+04	NA	NA	NA
634044	Methyl-Tertiary-Butyl Ether	NA	NA	NA	5.10E+07	NA	NA	7.6E-07
75092	Methylene chloride	NA	NA	NA	1.30E+07	NA	NA	NA
127184	Tetrachloroethylene	NA	NA	NA	2.00E+05	NA	NA	NA
108883	Toluene	NA	NA	NA	5.26E+05	NA	NA	6.9E-05
156605	trans-1,2-Dichloroethylene	NA	NA	NA	6.30E+06	NA	NA	4.6E-06
79016	Trichloroethylene	NA	NA	NA	1.10E+06	NA	NA	1.8E-06
75014	Vinyl chloride	NA	NA	NA	2.76E+06	NA	4.5E-08	5.9E-04
1330207	Xylenes	NA	NA	NA	2.20E+05	NA	NA	NA
98862	Acetophenone	NA	NA	NA	6.13E+06	NA	NA	NA
91203	Naphthalene	NA	NA	NA	3.10E+04	NA	NA	3.7E-06
91576	Methylnaphthalene, 2-	NA	NA	NA	2.46E+04	NA	NA	NA
92524	Biphenyl, 1,1'-	NA	NA	NA	6.94E+03	NA	NA	NA
208968	Acenaphthylene	NA	NA	NA	3.93E+03	NA	NA	1.8E-06
83329	Acenaphthene	NA	NA	NA	4.24E+03	NA	NA	NA
86737	Fluorene	NA	NA	NA	1.90E+03	NA	NA	NA
85018	Phenanthrene	NA	NA	NA	1.28E+03	NA	NA	8.2E-07
120127	Anthracene	NA	NA	NA	4.34E+01	NA	NA	NA
C9-C18	C9-C18 Aliphatics	NA	NA	NA	1.00E+04	NA	NA	1.7E-03
C11-C22	C11-C22 Aromatics	NA	NA	NA	5.80E+06	NA	NA	NA
C5-C8	C5-C8 Aliphatics	NA	NA	NA	1.10E+07	NA	NA	1.0E-02
C9-C10	C9-C10 Aromatics	NA	NA	NA	5.10E+07	NA	NA	NA
C9-C12	C9-C12 Aliphatics	NA	NA	NA	7.00E+04	NA	NA	1.4E-03

	95% UCL Cancer Risk	95% UCL HI
TOTAL:	5E-08	1E-02

= Cancer risk > 1E-05 or HQ/HI>1E+00

END

Appendix C.4
Johnson & Ettinger Model - Data Entry Screen
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - CT
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Whitney Barrel

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	Chemical	ENTER 95% UCL groundwater conc., C_w (µg/L)	ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, LWT (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_s (°C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR Note	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone soil dry bulk density, ρ_b^v (g/cm^3)	ENTER Vadose zone soil total porosity, n^v (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^v (cm^3/cm^3)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_c (yrs)	ENTER Averaging time for noncarcinogens, AT_{nc} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Exposure time ET (hrs/day)	ENTER Conversion factor CF (hr/s/yr)
71556	1,1,1-Trichloroethane	4.62E+00	15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
76131	Trichloro-1,2,2-trifluoroethane, 1,1,2-		15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
79005	1,1,2-Trichloroethane		15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
75343	1,1-Dichloroethane	2.54E+01	15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
75354	1,1-Dichloroethylene		15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
120821	1,2,4-Trichlorobenzene		15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
95501	1,2-Dichlorobenzene	7.43E+00	15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
541731	Dichlorobenzene, 1,3-	5.10E+00	15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
106467	1,4-Dichlorobenzene	4.11E+01	15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
78933	Butanone, 2- (MEK)		15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
67641	Acetone		15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
71432	Benzene	2.13E+01	15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
74839	Bromomethane		15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
75150	Carbon Disulfide		15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
108907	Chlorobenzene	4.90E+00	15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
75003	Ethyl Chloride		15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
67663	Chloroform		15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
156592	cis-1,2-Dichloroethylene	9.74E+01	15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
110827	Cyclohexane		15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
100414	Ethylbenzene	1.01E+01	15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
98828	Isopropylbenzene		15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
108872	Methylcyclohexane		15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
1634044	Methyl-Tertiary-Butyl Ether	1.28E+02	15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
75092	Methylene chloride		15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
127184	Tetrachloroethylene		15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
108883	Toluene	2.45E+02	15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
156605	trans-1,2-Dichloroethylene	4.30E+00	15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
79016	Trichloroethylene	2.00E+00	15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
75014	Vinyl chloride	8.50E+01	15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
1330207	Xylenes		15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
98862	Acetophenone		15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
91203	Naphthalene	9.60E+00	15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
91576	Methylnaphthalene, 2-		15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
92524	Biphenyl, 1,1'-		15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
208968	Acenaphthylene	3.20E+00	15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
83329	Acenaphthene		15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
86737	Fluorene		15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
85018	Phenanthrene	3.10E+00	15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
120127	Anthracene		15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
C9-C18	C9-C18 Aliphatics	4.95E+01	15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
C11-C22	C11-C22 Aromatics		15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
C5-C8	C5-C8 Aliphatics	1.64E+02	15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
C9-C10	C9-C10 Aromatics		15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
C9-C12	C9-C12 Aliphatics	2.67E+01	15	74.98	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760

Note:
1) Default soil parameters from table 7 of User's Guide for Evaluating Subsurface Vapor Intrusion into Building (U.S. EPA June 19, 2003) were used for soil water filled porosity (θ_w), soil organic carbon fraction (f_{oc}), soil total porosity (n), and soil dry bulk density (ρ_b).

Appendix C.4
Johnson & Ettinger Model - Chemical Properties Screen
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - CT
Southwest Prperties, Wells G&H Superfund Site, Operable Unit 2
Whitney Barrel

Chemical CAS No.	Chemical	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
71556	1,1,1-Trichloroethane	7.80E-02	8.80E-06	1.72E-02	25	7,136	347.24	545.00	1.10E+02	1.33E+03	N/A	2.2E+00
76131	Trichloro-1,2,2-triflouroethane, 1,	2.88E-02	8.07E-06	5.17E-01	25	1,326	320.70	481.05	2.25E+02	1.70E+02	N/A	3.0E+01
79005	1,1,2-Trichloroethane	7.80E-02	8.80E-06	9.12E-04	25	8,322	386.15	602.00	5.01E+01	4.42E+03	1.6E-05	2.2E+00
75343	1,1-Dichloroethane	7.42E-02	1.05E-05	5.61E-03	25	6,895	330.55	523.00	3.16E+01	5.06E+03	N/A	5.0E-01
75354	1,1-Dichloroethylene	9.00E-02	1.04E-05	2.61E-02	25	6,247	304.75	576.05	5.89E+01	2.25E+03	N/A	2.0E-01
120821	1,2,4-Trichlorobenzene	3.00E-02	8.23E-06	1.42E-03	25	10,471	486.15	725.00	1.78E+03	3.00E+02	N/A	2.0E-01
95501	1,2-Dichlorobenzene	6.88E-02	9.41E-06	1.62E-06	25	1,223	465.00	697.50	5.34E+01	2.77E+04	N/A	N/A
541731	Dichlorobenzene, 1,3-	4.14E-02	8.85E-06	4.70E-03	25	1,242	446.00	683.96	1.70E+02	6.88E+01	N/A	N/A
106467	1,4-Dichlorobenzene	6.90E-02	7.90E-06	2.43E-03	25	9,271	447.21	684.75	6.17E+02	7.38E+01	N/A	8.0E-01
78933	Butanone, 2- (MEK)	8.08E-02	9.80E-06	5.60E-05	25	1,311	352.50	528.75	3.83E+00	2.23E+05	N/A	N/A
67641	Acetone	1.24E-01	1.14E-05	3.88E-05	25	6,955	329.20	508.10	5.75E-01	1.00E+06	N/A	N/A
71432	Benzene	8.80E-02	9.80E-06	5.56E-03	25	7,342	353.24	562.16	5.89E+01	1.75E+03	7.8E-06	3.0E-02
74839	Bromomethane	7.28E-02	1.21E-05	6.22E-03	25	1,362	276.50	414.75	1.43E+01	1.52E+04	N/A	5.0E-03
75150	Carbon Disulfide	1.04E-01	1.29E-05	1.27E-02	25	6,391	319.00	552.00	5.14E+01	2.67E+03	N/A	7.0E-01
108907	Chlorobenzene	7.30E-02	8.70E-06	3.71E-03	25	8,410	404.87	632.40	2.19E+02	4.72E+02	N/A	6.0E-02
75003	Ethyl Chloride	1.26E-01	6.50E-06	8.67E-03	25	1,355	249.00	373.50	1.43E+01	5.32E+03	N/A	1.0E+01
67663	Chloroform	1.04E-01	1.00E-05	3.66E-03	25	6,988	334.32	536.40	3.98E+01	7.92E+03	2.3E-05	5.0E-02
156592	cis-1,2-Dichloroethylene	7.36E-02	1.13E-05	4.07E-03	25	7,192	333.65	544.00	3.55E+01	3.50E+03	N/A	2.0E-01
110827	Cyclohexane	8.00E-02	9.00E-06	2.00E+00	25	1,309	353.85	530.78	1.60E+02	5.50E+01	#N/A	#N/A
100414	Ethylbenzene	7.50E-02	7.80E-06	7.88E-03	25	8,501	409.34	617.20	3.63E+02	1.69E+02	N/A	1.0E+00
98828	Isopropylbenzene	6.50E-02	7.83E-06	1.47E-02	25	1,259	425.40	631.01	9.31E+03	5.60E+01	N/A	4.0E-01
108872	Methyl cyclohexane	9.86E-02	8.52E-06	4.23E-01	25	1,296	373.90	560.85	2.68E+02	1.40E+01	N/A	3.0E+00
1634044	Methyl-Tertiary-Butyl Ether	1.02E-01	1.05E-05	5.87E-04	25	1,324	328.36	497.11	3.84E+01	5.10E+04	N/A	3.0E+00
75092	Methylene chloride	1.01E-01	1.17E-05	2.19E-03	25	6,706	313.00	510.00	1.17E+01	1.30E+04	4.7E-07	3.0E+00
127184	Tetrachloroethylene	7.20E-02	8.20E-06	1.84E-02	25	8,288	394.40	620.20	1.55E+02	2.00E+02	5.9E-06	N/A
108883	Toluene	8.70E-02	8.60E-06	6.63E-03	25	7,930	383.78	591.79	1.82E+02	5.26E+02	N/A	4.0E-01
156605	trans-1,2-Dichloroethylene	7.07E-02	1.19E-05	9.39E-03	25	1,333	320.85	516.50	5.25E+01	6.30E+03	N/A	2.0E-01
79016	Trichloroethylene	7.90E-02	9.10E-06	1.03E-02	25	7,505	360.36	544.20	1.66E+02	1.10E+03	N/A	4.0E-02
75014	Vinyl chloride	1.06E-01	1.23E-05	2.71E-02	25	5,250	259.25	432.00	1.86E+01	2.76E+03	8.8E-06	1.0E-01
1330207	Xylenes	7.69E-02	8.44E-06	6.73E-06	25	1,264	417.40	616.21	2.41E+02	2.20E+02	N/A	1.0E-01
98862	Acetophenone	6.00E-02	8.73E-06	1.02E-05	25	1,214	475.00	712.50	4.62E+01	6.13E+03	N/A	N/A
91203	Naphthalene	5.90E-02	7.50E-06	4.83E-04	25	10,373	491.14	748.40	2.00E+03	3.10E+01	N/A	3.0E-03
91576	Methylnaphthalene, 2-	4.84E-02	7.75E-06	1.01E-03	25	1,169	514.05	761.01	8.51E+03	2.46E+01	N/A	3.0E-03
92524	Biphenyl, 1,1'-	4.04E-02	8.15E-06	3.03E-04	25	1,149	529.10	793.65	6.25E+03	6.94E+00	N/A	N/A
208968	Acenaphthylene	4.43E-02	7.44E-06	2.80E-04	25	1,118	553.00	792.01	4.79E+03	3.93E+00	N/A	3.0E-03
83329	Acenaphthene	4.21E-02	7.69E-06	1.55E-04	25	12,155	550.54	803.15	7.08E+03	4.24E+00	N/A	3.0E-03
86737	Fluorene	3.63E-02	7.88E-06	9.41E-08	25	12,666	570.44	870.00	7.71E+03	1.90E+00	N/A	3.0E-03
85018	Phenanthrene	3.30E-02	7.47E-06	1.30E-04	25	1,057	613.00	869.01	1.41E+04	1.28E+00	N/A	3.0E-03
120127	Anthracene	3.24E-02	7.74E-06	6.51E-05	25	13,121	615.18	873.00	2.95E+04	4.34E-02	N/A	3.0E-03
C9-C18	C9-C18 Aliphatics	6.00E-02	1.00E-05	1.66E+00	25	NA	NA	NA	6.80E+05	1.00E+01	N/A	2.0E-01
C11-C22	C11-C22 Aromatics	6.00E-02	1.00E-05	7.32E-04	25	NA	NA	NA	5.00E+03	5.80E+03	N/A	5.0E-02
C5-C8	C5-C8 Aliphatics	6.00E-02	1.00E-05	1.30E+00	25	NA	NA	NA	2.27E+03	1.10E+04	N/A	2.0E-01
C9-C10	C9-C10 Aromatics	6.00E-02	1.00E-05	7.92E-03	25	NA	NA	NA	1.78E+03	5.10E+04	N/A	5.0E-02
C9-C12	C9-C12 Aliphatics	6.00E-02	1.00E-05	1.56E+00	25	NA	NA	NA	1.50E+05	7.00E+01	N/A	2.0E-01

Appendix C.4
Johnson & Ettinger Model - Calculations Screen
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - CT
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Whitney Barrel

		Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^v (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, Xcrack (cm)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)
71556	1,1,1-Trichloroethane	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	7,885	8.53E-03	3.66E-01
76131	Trichloro-1,2,2-trifluoroethane, 1,1,2-	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	9,572	4.55E-01	1.96E+01
79005	1,1,2-Trichloroethane	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1,436	4.55E-01	1.96E+01
75343	1,1-Dichloroethane	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	9,572	3.88E-04	1.67E-02
75354	1,1-Dichloroethylene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	7,450	2.88E-03	1.24E-01
120821	1,2,4-Trichlorobenzene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	6,392	1.47E-02	6.34E-01
95501	1,2-Dichlorobenzene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	10,230	4.35E-04	1.87E-02
541731	Dichlorobenzene, 1,3-	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1,521	1.41E-06	6.09E-05
106467	1,4-Dichlorobenzene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1,503	4.11E-03	1.77E-01
78933	Butanone, 2- (MEK)	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	11,243	8.69E-04	3.83E-02
67641	Acetone	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1,486	4.90E-05	2.11E-03
71432	Benzene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	7,559	1.97E-03	8.50E-02
74839	Bromomethane	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	6,122	2.69E-03	1.16E-01
75150	Carbon Disulfide	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1,337	5.52E-03	2.38E-01
108907	Chlorobenzene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	6,682	6.99E-03	3.01E-01
75003	Ethyl Chloride	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	9,603	1.54E-03	6.65E-02
67663	Chloroform	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1,201	7.79E-03	3.35E-01
156592	cis-1,2-Dichloroethylene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	7,564	1.86E-03	8.02E-02
110827	Cyclohexane	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	7,734	2.04E-03	8.77E-02
100414	Ethylbenzene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1,486	1.75E+00	7.54E+01
98828	Isopropylbenzene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	10,155	3.18E-03	1.37E-01
108872	Methyl cyclohexane	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1,540	1.28E-02	5.51E-01
1634044	Methyl-Tertiary-Butyl Ether	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1,505	3.70E-01	1.59E+01
75092	Methylene chloride	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1,447	5.16E-04	2.22E-02
127184	Tetrachloroethylene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	7,034	1.17E-03	5.03E-02
108883	Toluene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	9,553	7.83E-03	3.37E-01
156605	trans-1,2-Dichloroethylene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	9,154	2.92E-03	1.26E-01
79016	Trichloroethylene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1,417	8.27E-03	3.56E-01
75014	Vinyl chloride	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	8,557	4.79E-03	2.06E-01
1330207	Xylenes	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	5,000	1.73E-02	7.46E-01
98862	Acetophenone	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1,542	5.66E-06	2.52E-04
91203	Naphthalene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1,518	8.91E-06	3.83E-04
91576	Methylnaphthalene, 2-	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	12,913	1.52E-04	6.55E-03
92524	Biphenyl, 1,1'-	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1,506	8.86E-04	3.81E-02
208968	Acenaphthylene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1,472	2.66E-04	1.14E-02
83329	Acenaphthene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1,513	2.45E-04	1.05E-02
86737	Fluorene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	16,123	3.67E-05	1.58E-03
85018	Phenanthrene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	15,235	2.20E-06	9.48E-05
120127	Anthracene	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	1,479	1.14E-04	4.90E-03
C9-C18	C9-C18 Aliphatics	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	18,353	1.26E-05	5.43E-04
C11-C22	C11-C22 Aromatics	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	NA	8.28E-01	3.56E+01
C5-C8	C5-C8 Aliphatics	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	NA	3.60E-04	1.55E-02
C9-C10	C9-C10 Aromatics	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	NA	6.48E-01	2.79E+01
C9-C12	C9-C12 Aliphatics	59.98	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	1.72E+04	2.52E+06	9.50E+06	1.30E-04	15	NA	3.96E-03	1.70E-01
																	NA	7.80E-01	3.36E+01

Appendix C.4
Johnson & Ettinger Model - Calculations Screen
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - CT
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Whitney Barrel

		Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_v (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
71556	1,1,1-Trichloroethane	1.75E-04	4.75E-04	4.45E-04	4.65E-04	59.98	15	1.69E+03	0.10	2.74E+01	4.75E-04	1.23E+03	4.36E+304	7.92E-06	1.34E-02	N/A	2.2E+00
76131	Trichloro-1,2,2-trifluoroethane, 1,1,2-	1.75E-04	1.75E-04	1.63E-04	1.71E-04	59.98	15	N/A	0.10	2.74E+01	1.75E-04	1.23E+03	#NUM!	5.40E-06	N/A	N/A	3.0E+01
79005	1,1,2-Trichloroethane	1.75E-04	5.24E-04	4.89E-04	5.15E-04	59.98	15	N/A	0.10	2.74E+01	5.24E-04	1.23E+03	8.56E+275	8.14E-06	N/A	1.6E-05	2.2E+00
75343	1,1-Dichloroethane	1.75E-04	4.58E-04	4.29E-04	4.49E-04	59.98	15	3.15E+03	0.10	2.74E+01	4.58E-04	1.23E+03	#NUM!	7.84E-06	2.47E-02	N/A	5.0E-01
75354	1,1-Dichloroethylene	1.75E-04	5.47E-04	5.12E-04	5.36E-04	59.98	15	N/A	0.10	2.74E+01	5.47E-04	1.23E+03	3.62E+264	8.22E-06	N/A	N/A	2.0E-01
120821	1,2,4-Trichlorobenzene	1.75E-04	2.25E-04	2.14E-04	2.22E-04	59.98	15	N/A	0.10	2.74E+01	2.25E-04	1.23E+03	#NUM!	6.10E-06	N/A	N/A	2.0E-01
95501	1,2-Dichlorobenzene	1.75E-04	1.56E-02	1.50E-02	1.57E-02	59.98	15	4.52E-01	0.10	2.74E+01	1.56E-02	1.23E+03	1.91E+09	1.08E-05	4.86E-06	N/A	N/A
541731	Dichlorobenzene, 1,3-	1.75E-04	2.56E-04	2.40E-04	2.51E-04	59.98	15	9.02E+02	0.10	2.74E+01	2.56E-04	1.23E+03	#NUM!	6.43E-06	5.80E-03	N/A	N/A
106467	1,4-Dichlorobenzene	1.75E-04	4.38E-04	4.12E-04	4.30E-04	59.98	15	1.87E+03	0.10	2.74E+01	4.38E-04	1.23E+03	#NUM!	7.75E-06	1.22E-02	N/A	8.0E-01
78933	Butanone, 2- (MEK)	1.75E-04	9.45E-04	9.27E-04	9.40E-04	59.98	15	N/A	0.10	2.74E+01	9.45E-04	1.23E+03	1.16E+153	9.18E-06	N/A	N/A	N/A
67641	Acetone	1.75E-04	2.07E-03	2.06E-03	2.07E-03	59.98	15	N/A	0.10	2.74E+01	2.07E-03	1.23E+03	9.18E+69	1.00E-05	N/A	N/A	N/A
71432	Benzene	1.75E-04	5.42E-04	5.07E-04	5.30E-04	59.98	15	2.46E+03	0.10	2.74E+01	5.42E-04	1.23E+03	1.61E+267	8.20E-06	2.02E-02	7.8E-06	3.0E-02
74839	Bromomethane	1.75E-04	4.46E-04	4.18E-04	4.37E-04	59.98	15	N/A	0.10	2.74E+01	4.46E-04	1.23E+03	#NUM!	7.79E-06	N/A	N/A	5.0E-03
75150	Carbon Disulfide	1.75E-04	6.34E-04	5.94E-04	6.21E-04	59.98	15	N/A	0.10	2.74E+01	6.34E-04	1.23E+03	1.25E+226	6.50E-06	N/A	N/A	7.0E-01
108907	Chlorobenzene	1.75E-04	4.55E-04	4.27E-04	4.46E-04	59.98	15	3.26E+02	0.10	2.74E+01	4.55E-04	1.23E+03	#NUM!	7.83E-06	2.55E-03	N/A	6.0E-02
75003	Ethyl Chloride	1.75E-04	7.66E-04	7.16E-04	7.49E-04	59.98	15	N/A	0.10	2.74E+01	7.66E-04	1.23E+03	1.14E+189	8.63E-06	N/A	N/A	1.0E+01
67663	Chloroform	1.75E-04	6.43E-04	6.02E-04	6.29E-04	59.98	15	N/A	0.10	2.74E+01	6.43E-04	1.23E+03	1.78E+225	8.53E-06	N/A	2.3E-05	9.8E-02
156592	cis-1,2-Dichloroethylene	1.75E-04	4.59E-04	4.30E-04	4.49E-04	59.98	15	8.54E+03	0.10	2.74E+01	4.59E-04	1.23E+03	#NUM!	7.85E-06	6.71E-02	N/A	2.0E-01
110827	Cyclohexane	1.75E-04	4.85E-04	4.53E-04	4.75E-04	59.98	15	N/A	0.10	2.74E+01	4.85E-04	1.23E+03	3.16E+296	7.97E-06	N/A	#N/A	#N/A
100414	Ethylbenzene	1.75E-04	4.60E-04	4.31E-04	4.51E-04	59.98	15	1.38E+03	0.10	2.74E+01	4.60E-04	1.23E+03	#NUM!	7.85E-06	1.09E-02	N/A	1.0E+00
98828	Isopropylbenzene	1.75E-04	3.95E-04	3.70E-04	3.87E-04	59.98	15	N/A	0.10	2.74E+01	3.95E-04	1.23E+03	#NUM!	7.51E-06	N/A	N/A	4.0E-01
108872	Methyl cyclohexane	1.75E-04	5.96E-04	5.59E-04	5.85E-04	59.98	15	N/A	0.10	2.74E+01	5.96E-04	1.23E+03	1.50E+242	8.39E-06	N/A	N/A	3.0E+00
1634044	Methyl-Tertiary-Butyl Ether	1.75E-04	6.67E-04	6.28E-04	6.54E-04	59.98	15	2.64E+03	0.10	2.74E+01	6.67E-04	1.23E+03	9.48E+216	8.60E-06	2.44E-02	N/A	3.0E+00
75092	Methylene chloride	1.75E-04	6.35E-04	5.96E-04	6.22E-04	59.98	15	N/A	0.10	2.74E+01	6.35E-04	1.23E+03	8.55E+227	8.51E-06	N/A	4.7E-07	3.0E+00
127184	Tetrachloroethylene	1.75E-04	4.39E-04	4.11E-04	4.30E-04	59.98	15	N/A	0.10	2.74E+01	4.39E-04	1.23E+03	#NUM!	7.75E-06	N/A	5.9E-06	N/A
108883	Toluene	1.75E-04	5.34E-04	5.00E-04	5.23E-04	59.98	15	3.08E+04	0.10	2.74E+01	5.34E-04	1.23E+03	1.10E+271	8.17E-06	2.52E-01	N/A	4.0E-01
156605	trans-1,2-Dichloroethylene	1.75E-04	4.32E-04	4.04E-04	4.23E-04	59.98	15	1.53E+03	0.10	2.74E+01	4.32E-04	1.23E+03	#NUM!	7.71E-06	1.18E-02	N/A	2.0E-01
79016	Trichloroethylene	1.75E-04	4.83E-04	4.52E-04	4.73E-04	59.98	15	4.13E+02	0.10	2.74E+01	4.83E-04	1.23E+03	3.77E+299	7.96E-06	3.28E-03	N/A	4.0E-02
75014	Vinyl chloride	1.75E-04	6.44E-04	6.02E-04	6.30E-04	59.98	15	6.34E+04	0.10	2.74E+01	6.44E-04	1.23E+03	5.27E+224	8.53E-06	5.41E-01	8.8E-06	1.0E-01
1330207	Xylenes	1.75E-04	3.75E-03	3.81E-03	3.77E-03	59.98	15	N/A	0.10	2.74E+01	3.75E-03	1.23E+03	4.03E+38	1.04E-05	N/A	N/A	1.0E-01
98862	Acetophenone	1.75E-04	2.60E-03	2.64E-03	2.61E-03	59.98	15	N/A	0.10	2.74E+01	2.60E-03	1.23E+03	4.82E+55	1.02E-05	N/A	N/A	N/A
91203	Naphthalene	1.75E-04	4.70E-04	4.50E-04	4.64E-04	59.98	15	6.29E+01	0.10	2.74E+01	4.70E-04	1.23E+03	9.67E+307	7.92E-06	4.98E-04	N/A	3.0E-03
91576	Methylnaphthalene, 2-	1.75E-04	3.13E-04	2.95E-04	3.07E-04	59.98	15	N/A	0.10	2.74E+01	3.13E-04	1.23E+03	#NUM!	6.95E-06	N/A	N/A	3.0E-03
92524	Biphenyl, 1,1'-	1.75E-04	3.15E-04	3.01E-04	3.10E-04	59.98	15	N/A	0.10	2.74E+01	3.15E-04	1.23E+03	#NUM!	6.98E-06	N/A	N/A	N/A
208968	Acenaphthylene	1.75E-04	3.38E-04	3.22E-04	3.33E-04	59.98	15	3.37E+01	0.10	2.74E+01	3.38E-04	1.23E+03	#NUM!	7.15E-06	2.41E-04	N/A	3.0E-03
83329	Acenaphthene	1.75E-04	7.33E-04	7.31E-04	7.33E-04	59.98	15	N/A	0.10	2.74E+01	7.33E-04	1.23E+03	2.13E+197	8.79E-06	N/A	N/A	3.0E-03
86737	Fluorene	1.75E-04	6.16E-01	6.39E-01	6.23E-01	59.98	15	N/A	0.10	2.74E+01	6.16E-01	1.23E+03	1.50E+00	3.24E-05	N/A	N/A	3.0E-03
85018	Phenanthrene	1.75E-04	3.50E-04	3.41E-04	3.47E-04	59.98	15	1.52E+01	0.10	2.74E+01	3.50E-04	1.23E+03	#NUM!	7.25E-06	1.10E-04	N/A	3.0E-03
120127	Anthracene	1.75E-04	1.60E-03	1.62E-03	1.60E-03	59.98	15	N/A	0.10	2.74E+01	1.60E-03	1.23E+03	5.14E+90	9.81E-06	N/A	N/A	3.0E-03
C9-C18	C9-C18 Aliphatics	1.75E-04	3.64E-04	3.40E-04	3.56E-04	59.98	15	1.76E+06	0.10	2.74E+01	3.64E-04	1.23E+03	#NUM!	7.32E-06	1.29E+01	N/A	2.0E-01
C11-C22	C11-C22 Aromatics	1.75E-04	4.27E-04	4.05E-04	4.20E-04	59.98	15	N/A	0.10	2.74E+01	4.27E-04	1.23E+03	#NUM!	7.70E-06	N/A	N/A	5.0E-02
C5-C8	C5-C8 Aliphatics	1.75E-04	3.64E-04	3.40E-04	3.56E-04	59.98	15	4.58E+06	0.10	2.74E+01	3.64E-04	1.23E+03	#NUM!	7.32E-06	3.35E+01	N/A	2.0E-01
C9-C10	C9-C10 Aromatics	1.75E-04	3.69E-04	3.46E-04	3.62E-04	59.98	15	N/A	0.10	2.74E+01	3.69E-04	1.23E+03	#NUM!	7.35E-06	N/A	N/A	5.0E-02
C9-C12	C9-C12 Aliphatics	1.75E-04	3.64E-04	3.40E-04	3.56E-04	59.98	15	6.95E+05	0.10	2.74E+01	3.64E-04	1.23E+03	#NUM!	7.32E-06	6.55E+00	N/A	2.0E-01

Appendix C.4
Johnson & Ettinger Model - Results
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - CT
Southwest Prperties, Wells G&H Superfund Site, Operable Unit 2
Whitney Barrel

		RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:					INCREMENTAL RISK CALCULATIONS:	
		Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
71556	1,1,1-Trichloroethane	NA	NA	NA	1.33E+06	NA	NA	4.5E-08
76131	Trichloro-1,2,2-trifluoroethane, 1,1,2-	NA	NA	NA	1.70E+05	NA	NA	NA
79005	1,1,2-Trichloroethane	NA	NA	NA	4.42E+06	NA	NA	NA
75343	1,1-Dichloroethane	NA	NA	NA	5.06E+06	NA	NA	3.7E-07
75354	1,1-Dichloroethylene	NA	NA	NA	2.25E+06	NA	NA	NA
120821	1,2,4-Trichlorobenzene	NA	NA	NA	3.00E+05	NA	NA	NA
95501	1,2-Dichlorobenzene	NA	NA	NA	2.77E+07	NA	NA	NA
541731	Dichlorobenzene, 1,3-	NA	NA	NA	6.88E+04	NA	NA	NA
106467	1,4-Dichlorobenzene	NA	NA	NA	7.38E+04	NA	NA	1.1E-07
78933	Butanone, 2- (MEK)	NA	NA	NA	2.23E+08	NA	NA	NA
67641	Acetone	NA	NA	NA	1.00E+09	NA	NA	NA
71432	Benzene	NA	NA	NA	1.75E+06	NA	3.3E-11	5.0E-06
74839	Bromomethane	NA	NA	NA	1.52E+07	NA	NA	NA
75150	Carbon Disulfide	NA	NA	NA	2.67E+06	NA	NA	NA
108907	Chlorobenzene	NA	NA	NA	4.72E+05	NA	NA	3.2E-07
75003	Ethyl Chloride	NA	NA	NA	5.32E+06	NA	NA	NA
67663	Chloroform	NA	NA	NA	7.92E+06	NA	NA	NA
156592	cis-1,2-Dichloroethylene	NA	NA	NA	3.50E+06	NA	NA	2.5E-06
110827	Cyclohexane	NA	NA	NA	5.50E+04	NA	NA	NA
100414	Ethylbenzene	NA	NA	NA	1.69E+05	NA	NA	8.1E-08
98828	Isopropylbenzene	NA	NA	NA	5.60E+04	NA	NA	NA
108872	Methyl cyclohexane	NA	NA	NA	1.40E+04	NA	NA	NA
1634044	Methyl-Tertiary-Butyl Ether	NA	NA	NA	5.10E+07	NA	NA	6.0E-08
75092	Methylene chloride	NA	NA	NA	1.30E+07	NA	NA	NA
127184	Tetrachloroethylene	NA	NA	NA	2.00E+05	NA	NA	NA
108883	Toluene	NA	NA	NA	5.26E+05	NA	NA	4.7E-06
156605	trans-1,2-Dichloroethylene	NA	NA	NA	6.30E+06	NA	NA	4.4E-07
79016	Trichloroethylene	NA	NA	NA	1.10E+06	NA	NA	6.1E-07
75014	Vinyl chloride	NA	NA	NA	2.76E+06	NA	1.0E-09	4.0E-05
1330207	Xylenes	NA	NA	NA	2.20E+05	NA	NA	NA
98862	Acetophenone	NA	NA	NA	6.13E+06	NA	NA	NA
91203	Naphthalene	NA	NA	NA	3.10E+04	NA	NA	1.2E-06
91576	Methylnaphthalene, 2-	NA	NA	NA	2.46E+04	NA	NA	NA
92524	Biphenyl, 1,1'-	NA	NA	NA	6.94E+03	NA	NA	NA
208968	Acenaphthylene	NA	NA	NA	3.93E+03	NA	NA	6.0E-07
83329	Acenaphthene	NA	NA	NA	4.24E+03	NA	NA	NA
86737	Fluorene	NA	NA	NA	1.90E+03	NA	NA	NA
85018	Phenanthrene	NA	NA	NA	1.28E+03	NA	NA	2.7E-07
120127	Anthracene	NA	NA	NA	4.34E+01	NA	NA	NA
C9-C18	C9-C18 Aliphatics	NA	NA	NA	1.00E+04	NA	NA	4.8E-04
C11-C22	C11-C22 Aromatics	NA	NA	NA	5.80E+06	NA	NA	NA
C5-C8	C5-C8 Aliphatics	NA	NA	NA	1.10E+07	NA	NA	1.2E-03
C9-C10	C9-C10 Aromatics	NA	NA	NA	5.10E+07	NA	NA	NA
C9-C12	C9-C12 Aliphatics	NA	NA	NA	7.00E+04	NA	NA	2.4E-04

	95% UCL Cancer Risk	95% UCL HI
TOTAL:	1E-09	2E-03

[ ] = Cancer risk > 1E-05 or HQ/HI>1E+00

END

Appendix C.4
Johnson & Ettinger Model - Data Entry Screen
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - RME
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Murphy Waste Oil

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	Chemical	ENTER 95% UCL groundwater conc., C_{w} (µg/L)	ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, LWT (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR Note	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Exposure time ET (hrs/day)	ENTER Conversion factor CF (hrs/yr)
71556	1,1,1-Trichloroethane	6.37E+01	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
76131	Trichloro-1,2,2-trifluoroethane, 1,1,2-		15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
79005	1,1,2-Trichloroethane		15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
75343	1,1-Dichloroethane	7.24E+01	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
75354	1,1-Dichloroethylene	9.00E+00	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
120821	1,2,4-Trichlorobenzene		15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
95501	1,2-Dichlorobenzene	1.00E+00	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
541731	Dichlorobenzene, 1,3-		15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
106467	1,4-Dichlorobenzene		15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
78933	Butanone, 2- (MEK)		15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
67641	Acetone	2.42E+01	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
71432	Benzene	6.64E+00	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
74839	Bromomethane	1.00E+00	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
75150	Carbon Disulfide		15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
108907	Chlorobenzene	1.00E+00	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
75003	Ethyl Chloride	3.05E+01	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
67663	Chloroform		15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
156592	cis-1,2-Dichloroethylene	7.43E+02	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
110827	Cyclohexane		15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
100414	Ethylbenzene	7.61E+00	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
98828	Isopropylbenzene		15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
108872	Methyl cyclohexane	7.00E+00	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
1634044	Methyl-Tertiary-Butyl Ether		15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
75092	Methylene chloride	1.59E+01	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
127184	Tetrachloroethylene	7.00E+00	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
108883	Toluene	1.71E+01	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
156605	trans-1,2-Dichloroethylene	1.23E+01	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
79016	Trichloroethylene	3.31E+01	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
75014	Vinyl chloride	1.85E+02	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
1330207	Xylenes		15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
98862	Acetophenone		15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
91203	Naphthalene	9.09E+00	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
91576	Methylnaphthalene, 2-	5.89E+00	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
92524	Biphenyl, 1,1'-		15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
208968	Acenaphthylene		15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
83329	Acenaphthene		15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
86737	Fluorene		15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
85018	Phenanthrene	5.74E+00	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
120127	Anthracene		15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
C9-C18	C9-C18 Aliphatics	9.61E+02	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
C11-C22	C11-C22 Aromatics	4.19E+02	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
C5-C8	C5-C8 Aliphatics	1.15E+02	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
C9-C10	C9-C10 Aromatics	7.18E+01	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
C9-C12	C9-C12 Aliphatics	3.30E+01	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760

Note:
1) Default soil parameters from table 7 of User's Guide for Evaluating Subsurface Vapor Intrusion into Building (U.S. EPA June 19, 2003) were used for soil water filled porosity (θ_{ws}), soil organic carbon fraction (f_{oc}), soil total porosity (n), and soil dry bulk density (ρ_b).

Appendix C.4
Johnson & Ettinger Model - Chemical Properties Screen
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - RME
Southwest Prperties, Wells G&H Superfund Site, Operable Unit 2
Murphy Waste Oil

Chemical CAS No.	Chemical	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
71556	1,1,1-Trichloroethane	7.80E-02	8.80E-06	1.72E-02	25	7,136	347.24	545.00	1.10E+02	1.33E+03	N/A	2.2E+00
76131	Trichloro-1,2,2-triflouroethane, 1,	2.88E-02	8.07E-06	5.17E-01	25	1,326	320.70	481.05	2.25E+02	1.70E+02	N/A	3.0E+01
79005	1,1,2-Trichloroethane	7.80E-02	8.80E-06	9.12E-04	25	8,322	386.15	602.00	5.01E+01	4.42E+03	1.6E-05	2.2E+00
75343	1,1-Dichloroethane	7.42E-02	1.05E-05	5.61E-03	25	6,895	330.55	523.00	3.16E+01	5.06E+03	N/A	5.0E-01
75354	1,1-Dichloroethylene	9.00E-02	1.04E-05	2.61E-02	25	6,247	304.75	576.05	5.69E+01	2.25E+03	N/A	2.0E-01
120821	1,2,4-Trichlorobenzene	3.00E-02	8.23E-06	1.42E-03	25	10,471	486.15	725.00	1.78E+03	3.00E+02	N/A	2.0E-01
95501	1,2-Dichlorobenzene	6.88E-02	9.41E-06	1.62E-06	25	1,223	465.00	697.50	5.34E+01	2.77E+04	N/A	N/A
541731	Dichlorobenzene, 1,3-	4.14E-02	8.85E-06	4.70E-03	25	1,242	446.00	683.96	1.70E+02	6.88E+01	N/A	N/A
106467	1,4-Dichlorobenzene	6.90E-02	7.90E-06	2.43E-03	25	9,271	447.21	684.75	6.17E+02	7.38E+01	N/A	8.0E-01
78933	Butanone, 2- (MEK)	8.08E-02	9.80E-06	5.60E-05	25	1,311	352.50	528.75	3.83E+00	2.23E+05	N/A	N/A
67641	Acetone	1.24E-01	1.14E-05	3.88E-05	25	6,955	329.20	508.10	5.75E-01	1.00E+06	N/A	N/A
71432	Benzene	8.80E-02	9.80E-06	5.56E-03	25	7,342	353.24	562.16	5.89E+01	1.75E+03	7.8E-06	3.0E-02
74839	Bromomethane	7.28E-02	1.21E-05	6.22E-03	25	1,362	276.50	414.75	1.43E+01	1.52E+04	N/A	5.0E-03
75150	Carbon Disulfide	1.04E-01	1.29E-05	1.27E-02	25	6,391	319.00	552.00	5.14E+01	2.67E+03	N/A	7.0E-01
108907	Chlorobenzene	7.30E-02	8.70E-06	3.71E-03	25	8,410	404.87	632.40	2.19E+02	4.72E+02	N/A	6.0E-02
75003	Ethyl Chloride	1.26E-01	6.50E-06	8.67E-03	25	1,355	249.00	373.50	1.43E+01	5.32E+03	N/A	1.0E+01
67663	Chloroform	1.04E-01	1.00E-05	3.66E-03	25	6,988	334.32	536.40	3.98E+01	7.92E+03	2.3E-05	5.0E-02
156592	cis-1,2-Dichloroethylene	7.36E-02	1.13E-05	4.07E-03	25	7,192	333.65	544.00	3.55E+01	3.50E+03	N/A	2.0E-01
110827	Cyclohexane	8.00E-02	9.00E-06	2.00E+00	25	1,309	353.85	530.78	1.60E+02	5.50E+01	#N/A	#N/A
100414	Ethylbenzene	7.50E-02	7.80E-06	7.88E-03	25	8,501	409.34	617.20	3.63E+02	1.69E+02	N/A	1.0E+00
98828	Isopropylbenzene	6.50E-02	7.83E-06	1.47E-02	25	1,259	425.40	631.01	9.31E+03	5.60E+01	N/A	4.0E-01
108872	Methyl cyclohexane	9.86E-02	8.52E-06	4.23E-01	25	1,296	373.90	560.85	2.68E+02	1.40E+01	N/A	3.0E+00
1634044	Methyl-Tertiary-Butyl Ether	1.02E-01	1.05E-05	5.87E-04	25	1,324	328.36	497.11	3.84E+01	5.10E+04	N/A	3.0E+00
75092	Methylene chloride	1.01E-01	1.17E-05	2.19E-03	25	6,706	313.00	510.00	1.17E+01	1.30E+04	4.7E-07	3.0E+00
127184	Tetrachloroethylene	7.20E-02	8.20E-06	1.84E-02	25	8,288	394.40	620.20	1.55E+02	2.00E+02	5.9E-06	N/A
108883	Toluene	8.70E-02	8.60E-06	6.63E-03	25	7,930	383.78	591.79	1.82E+02	5.26E+02	N/A	4.0E-01
156605	trans-1,2-Dichloroethylene	7.07E-02	1.19E-05	9.39E-03	25	1,333	320.85	516.50	5.25E+01	6.30E+03	N/A	2.0E-01
79016	Trichloroethylene	7.90E-02	9.10E-06	1.03E-02	25	7,505	360.36	544.20	1.66E+02	1.10E+03	N/A	4.0E-02
75014	Vinyl chloride	1.06E-01	1.23E-05	2.71E-02	25	5,250	259.25	432.00	1.86E+01	2.76E+03	8.8E-06	1.0E-01
1330207	Xylenes	7.69E-02	8.44E-06	6.73E-06	25	1,264	417.40	616.21	2.41E+02	2.20E+02	N/A	1.0E-01
98862	Acetophenone	6.00E-02	8.73E-06	1.02E-05	25	1,214	475.00	712.50	4.62E+01	6.13E+03	N/A	N/A
91203	Naphthalene	5.90E-02	7.50E-06	4.83E-04	25	10,373	491.14	748.40	2.00E+03	3.10E+01	N/A	3.0E-03
91576	Methylnaphthalene, 2-	4.84E-02	7.75E-06	1.01E-03	25	1,169	514.05	761.01	8.51E+03	2.46E+01	N/A	3.0E-03
92524	Biphenyl, 1,1'-	4.04E-02	8.15E-06	3.03E-04	25	1,149	529.10	793.65	6.25E+03	6.94E+00	N/A	N/A
208968	Acenaphthylene	4.43E-02	7.44E-06	2.80E-04	25	1,118	553.00	792.01	4.79E+03	3.93E+00	N/A	3.0E-03
83329	Acenaphthene	4.21E-02	7.69E-06	1.55E-04	25	12,155	550.54	803.15	7.08E+03	4.24E+00	N/A	3.0E-03
86737	Fluorene	3.63E-02	7.88E-06	9.41E-08	25	12,666	570.44	870.00	7.71E+03	1.90E+00	N/A	3.0E-03
85018	Phenanthrene	3.30E-02	7.47E-06	1.30E-04	25	1,057	613.00	869.01	1.41E+04	1.28E+00	N/A	3.0E-03
120127	Anthracene	3.24E-02	7.74E-06	6.51E-05	25	13,121	615.18	873.00	2.95E+04	4.34E-02	N/A	3.0E-03
C9-C18	C9-C18 Aliphatics	6.00E-02	1.00E-05	1.66E+00	25	NA	NA	NA	6.80E+05	1.00E+01	N/A	2.0E-01
C11-C22	C11-C22 Aromatics	6.00E-02	1.00E-05	7.32E-04	25	NA	NA	NA	5.00E+03	5.80E+03	N/A	5.0E-02
C5-C8	C5-C8 Aliphatics	6.00E-02	1.00E-05	1.30E+00	25	NA	NA	NA	2.27E+03	1.10E+04	N/A	2.0E-01
C9-C10	C9-C10 Aromatics	6.00E-02	1.00E-05	7.92E-03	25	NA	NA	NA	1.78E+03	5.10E+04	N/A	5.0E-02
C9-C12	C9-C12 Aliphatics	6.00E-02	1.00E-05	1.56E+00	25	NA	NA	NA	1.50E+05	7.00E+01	N/A	2.0E-01

Appendix C.4
Johnson & Ettinger Model - Calculations Screen
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - RME
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Murphy Waste Oil

		Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, Xcrack (cm)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's Law constant at ave. groundwater temperature, H_{TS} ($atm-m^3/mol$)	Henry's law constant at ve. groundwab temperature, H'_{TS} (unitless)
71556	1,1,1-Trichloroethane	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	7,885	8.50E-03	3.66E-01
79131	Trichloro-1,2,2-trifluoroethane, 1,1,2-	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1,436	4.55E-01	1.96E+01
79005	1,1,2-Trichloroethane	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1,436	4.55E-01	1.96E+01
75343	1,1-Dichloroethane	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	6,672	3.88E-04	1.67E-02
75354	1,1-Dichloroethylene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	7,450	2.88E-03	1.24E-01
120821	1,2,4-Trichlorobenzene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	6,302	1.47E-02	6.34E-01
95501	1,2-Dichlorobenzene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	13,230	4.35E-04	1.87E-02
541731	Dichlorobenzene, 1,3-	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1,521	1.41E-06	6.09E-05
106467	1,4-Dichlorobenzene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1,503	4.11E-03	1.77E-01
78933	Butanone, 2- (MEK)	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	11,243	8.89E-04	3.83E-02
67641	Acetone	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1,486	4.90E-05	2.11E-03
71432	Benzene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	7,559	1.97E-03	8.50E-04
74839	Bromomethane	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	6,122	2.69E-03	1.16E-01
75150	Carbon Disulfide	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1,337	5.52E-03	2.38E-01
108907	Chlorobenzene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	6,682	6.99E-03	3.01E-01
75003	Ethyl Chloride	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	9,803	1.54E-03	6.65E-02
67663	Chloroform	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1,201	7.79E-03	3.35E-01
156592	cis-1,2-Dichloroethylene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	7,554	1.86E-03	8.02E-02
110827	Cyclohexane	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	7,734	2.04E-03	8.77E-02
100414	Ethylbenzene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1,486	1.75E+00	7.54E+01
98828	Isopropylbenzene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	10,155	3.16E-03	1.37E-01
108872	Methyl cyclohexane	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1,540	1.28E-02	5.51E-01
1634044	Methyl-Tertiary-Butyl Ether	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1,505	3.70E-01	1.59E+01
75092	Methylene chloride	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1,447	5.16E-04	2.22E-02
127184	Tetrachloroethylene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	7,034	1.17E-03	5.03E-02
108883	Toluene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	9,553	7.83E-03	3.37E-01
156605	trans-1,2-Dichloroethylene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	9,154	2.92E-03	1.26E-01
79016	Trichloroethylene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1,417	8.27E-03	3.56E-01
75014	Vinyl chloride	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	8,557	4.79E-03	2.06E-01
1330207	Xylenes	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	9,000	1.73E-02	7.46E-01
98862	Acetophenone	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1,542	5.86E-06	2.52E-04
91203	Naphthalene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1,518	8.91E-06	3.83E-04
91576	Methylnaphthalene, 2-	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	12,913	1.52E-04	6.55E-03
92524	Biphenyl, 1,1-	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1,508	8.86E-04	3.81E-02
208968	Acenaphthylene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1,472	2.66E-04	1.14E-02
83329	Acenaphthene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1,513	2.45E-04	1.05E-02
86737	Fluorene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	16,123	3.67E-05	1.58E-03
85018	Phenanthrene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	16,235	2.20E-06	9.45E-05
120127	Anthracene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1,479	1.14E-04	4.90E-03
C9-C18	C9-C18 Aliphatics	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	18,353	1.26E-05	5.43E-04
C11-C22	C11-C22 Aromatics	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	NA	8.26E-01	3.56E+01
C5-C8	C5-C8 Aliphatics	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	NA	3.60E-04	1.55E-02
C9-C10	C9-C10 Aromatics	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	NA	6.48E-01	2.79E+01
C9-C12	C9-C12 Aliphatics	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	NA	3.96E-03	1.70E-01
		47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	NA	7.80E-01	3.36E+01

Appendix C.4
Johnson & Ettinger Model - Calculations Screen
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - RME
Southwest Properties, Wells G&H Superfund Site, Oper.
Murphy Waste Oil

		Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_v, (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T, (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
71556	1,1,1-Trichloroethane	1.75E-04	4.75E-04	4.45E-04	4.63E-04	47.78	15	1.93E+04	0.10	1.04E+01	4.75E-04	6.45E+02	9.58E+220	1.06E-05	2.05E-01	N/A	2.2E+00
76131	Trichloro-1,2,2-trifluoroethane, 1,1,2-	1.75E-04	1.75E-04	1.63E-04	1.70E-04	47.78	15	N/A	0.10	1.04E+01	1.75E-04	6.45E+02	#NUM!	7.06E-06	N/A	N/A	3.0E+01
79005	1,1,2-Trichloroethane	1.75E-04	5.24E-04	4.95E-04	5.13E-04	47.78	15	N/A	0.10	1.04E+01	5.24E-04	6.45E+02	1.44E+200	1.05E-05	N/A	1.6E-05	2.2E+00
75343	1,1-Dichloroethane	1.75E-04	4.58E-04	4.29E-04	4.46E-04	47.78	15	8.97E+03	0.10	1.04E+01	4.58E-04	6.45E+02	1.67E+229	1.05E-05	9.43E-02	N/A	5.0E-01
75354	1,1-Dichloroethylene	1.75E-04	5.47E-04	5.12E-04	5.33E-04	47.78	15	5.71E+03	0.10	1.04E+01	5.47E-04	6.45E+02	8.08E+191	1.10E-05	6.30E-02	N/A	2.0E-01
120821	1,2,4-Trichlorobenzene	1.75E-04	2.25E-04	2.14E-04	2.21E-04	47.78	15	N/A	0.10	1.04E+01	2.25E-04	6.45E+02	#NUM!	8.04E-06	N/A	N/A	2.0E-01
95501	1,2-Dichlorobenzene	1.75E-04	1.56E-02	1.60E-02	1.58E-02	47.78	15	6.09E-02	0.10	1.04E+01	1.56E-02	6.45E+02	5.40E+06	1.48E-05	9.02E-07	N/A	N/A
541731	Dichlorobenzene, 1,3-	1.75E-04	2.56E-04	2.40E-04	2.49E-04	47.78	15	N/A	0.10	1.04E+01	2.56E-04	6.45E+02	#NUM!	8.49E-06	N/A	N/A	N/A
106467	1,4-Dichlorobenzene	1.75E-04	4.38E-04	4.12E-04	4.28E-04	47.78	15	N/A	0.10	1.04E+01	4.38E-04	6.45E+02	2.83E+239	1.04E-05	N/A	N/A	8.0E-01
78933	Butanone, 2- (MEK)	1.75E-04	9.45E-04	9.27E-04	9.38E-04	47.78	15	N/A	0.10	1.04E+01	9.45E-04	6.45E+02	1.09E+111	1.25E-05	N/A	N/A	N/A
67641	Acetone	1.75E-04	2.07E-03	2.06E-03	2.06E-03	47.78	15	2.06E+01	0.10	1.04E+01	2.07E-03	6.45E+02	5.63E+50	1.37E-05	2.83E-04	N/A	N/A
71432	Benzene	1.75E-04	5.42E-04	5.07E-04	5.28E-04	47.78	15	7.57E+02	0.10	1.04E+01	5.42E-04	6.45E+02	6.73E+193	1.10E-05	6.34E-03	7.8E-06	3.0E-02
74839	Bromomethane	1.75E-04	4.46E-04	4.18E-04	4.35E-04	47.78	15	2.35E+02	0.10	1.04E+01	4.46E-04	6.45E+02	1.91E+235	1.04E-05	2.47E-03	N/A	5.0E-03
75150	Carbon Disulfide	1.75E-04	6.34E-04	5.94E-04	6.18E-04	47.78	15	N/A	0.10	1.04E+01	6.34E-04	6.45E+02	2.87E+165	1.15E-05	N/A	N/A	7.0E-01
108907	Chlorobenzene	1.75E-04	4.55E-04	4.27E-04	4.44E-04	47.78	15	6.65E+01	0.10	1.04E+01	4.55E-04	6.45E+02	3.97E+230	1.05E-05	6.97E-04	N/A	6.0E-02
75003	Ethyl Chloride	1.75E-04	7.66E-04	7.16E-04	7.45E-04	47.78	15	1.02E+04	0.10	1.04E+01	7.66E-04	6.45E+02	1.38E+137	1.19E-05	1.22E-01	N/A	1.0E+01
67663	Chloroform	1.75E-04	6.43E-04	6.02E-04	6.26E-04	47.78	15	N/A	0.10	1.04E+01	6.43E-04	6.45E+02	2.45E+163	1.15E-05	N/A	2.3E-05	5.0E-02
156592	cis-1,2-Dichloroethylene	1.75E-04	4.59E-04	4.30E-04	4.47E-04	47.78	15	6.52E+04	0.10	1.04E+01	4.59E-04	6.45E+02	7.49E+228	1.05E-05	6.85E-01	N/A	2.0E-01
110827	Cyclohexane	1.75E-04	4.85E-04	4.53E-04	4.72E-04	47.78	15	N/A	0.10	1.04E+01	4.85E-04	6.45E+02	3.37E+216	1.07E-05	N/A	#N/A	#N/A
100414	Ethylbenzene	1.75E-04	4.60E-04	4.31E-04	4.48E-04	47.78	15	1.04E+03	0.10	1.04E+01	4.60E-04	6.45E+02	1.44E+228	1.05E-05	1.09E-02	N/A	1.0E+00
98828	Isopropylbenzene	1.75E-04	3.95E-04	3.70E-04	3.85E-04	47.78	15	N/A	0.10	1.04E+01	3.95E-04	6.45E+02	3.75E+265	1.00E-05	N/A	N/A	4.0E-01
108872	Methyl cyclohexane	1.75E-04	5.98E-04	5.59E-04	5.82E-04	47.78	15	1.11E+05	0.10	1.04E+01	5.98E-04	6.45E+02	4.68E+175	1.13E-05	1.26E+00	N/A	3.0E+00
1634044	Methyl-Tertiary-Butyl Ether	1.75E-04	6.67E-04	6.28E-04	6.51E-04	47.78	15	N/A	0.10	1.04E+01	6.67E-04	6.45E+02	2.47E+157	1.16E-05	N/A	N/A	3.0E+00
75092	Methylene chloride	1.75E-04	6.35E-04	5.96E-04	6.19E-04	47.78	15	7.98E+02	0.10	1.04E+01	6.35E-04	6.45E+02	2.18E+165	1.15E-05	9.14E-03	4.7E-07	3.0E+00
127184	Tetrachloroethylene	1.75E-04	4.39E-04	4.11E-04	4.27E-04	47.78	15	2.36E+03	0.10	1.04E+01	4.39E-04	6.45E+02	1.92E+239	1.04E-05	2.45E-02	5.9E-06	N/A
108883	Toluene	1.75E-04	5.34E-04	5.00E-04	5.20E-04	47.78	15	2.16E+03	0.10	1.04E+01	5.34E-04	6.45E+02	4.07E+196	1.10E-05	2.37E-02	N/A	4.0E-01
156605	trans-1,2-Dichloroethylene	1.75E-04	4.32E-04	4.04E-04	4.20E-04	47.78	15	4.55E+03	0.10	1.04E+01	4.32E-04	6.45E+02	1.43E+243	1.03E-05	4.69E-02	N/A	2.0E-01
79016	Trichloroethylene	1.75E-04	4.83E-04	4.52E-04	4.70E-04	47.78	15	6.83E+03	0.10	1.04E+01	4.83E-04	6.45E+02	2.03E+217	1.07E-05	7.28E-02	N/A	4.0E-02
75014	Vinyl chloride	1.75E-04	6.44E-04	6.02E-04	6.27E-04	47.78	15	1.38E+05	0.10	1.04E+01	6.44E-04	6.45E+02	1.02E+183	1.15E-05	1.59E+00	8.8E-06	1.0E-01
1330207	Xylenes	1.75E-04	3.76E-03	3.51E-03	3.77E-03	47.78	15	N/A	0.10	1.04E+01	3.75E-03	6.45E+02	1.01E+28	1.43E-05	N/A	N/A	1.0E-01
98862	Acetophenone	1.75E-04	2.60E-03	2.64E-03	2.62E-03	47.78	15	N/A	0.10	1.04E+01	2.60E-03	6.45E+02	2.48E+40	1.40E-05	N/A	N/A	N/A
91203	Naphthalene	1.75E-04	4.70E-04	4.50E-04	4.62E-04	47.78	15	5.06E+01	0.10	1.04E+01	4.70E-04	6.45E+02	2.56E+223	1.06E-05	5.32E-04	N/A	3.0E-03
91578	Methylnaphthalene, 2-	1.75E-04	3.13E-04	2.95E-04	3.06E-04	47.78	15	2.24E+02	0.10	1.04E+01	3.13E-04	6.45E+02	#NUM!	9.23E-06	2.07E-03	N/A	3.0E-03
92524	Biphenyl, 1,1'-	1.75E-04	3.15E-04	3.01E-04	3.09E-04	47.78	15	N/A	0.10	1.04E+01	3.15E-04	6.45E+02	#NUM!	9.27E-06	N/A	N/A	N/A
208968	Acenaphthylene	1.75E-04	3.38E-04	3.22E-04	3.31E-04	47.78	15	N/A	0.10	1.04E+01	3.38E-04	6.45E+02	#NUM!	9.51E-06	N/A	N/A	3.0E-03
83329	Acenaphthene	1.75E-04	7.33E-04	7.31E-04	7.32E-04	47.78	15	N/A	0.10	1.04E+01	7.33E-04	6.45E+02	1.38E+143	1.19E-05	N/A	N/A	3.0E-03
86737	Fluorene	1.75E-04	8.16E-01	8.39E-01	8.25E-01	47.78	15	N/A	0.10	1.04E+01	8.16E-01	6.45E+02	1.34E+00	5.84E-05	N/A	N/A	3.0E-03
85018	Phenanthrene	1.75E-04	3.50E-04	3.41E-04	3.46E-04	47.78	15	2.81E+01	0.10	1.04E+01	3.50E-04	6.45E+02	2.10E+300	9.66E-06	2.72E-04	N/A	3.0E-03
120127	Anthracene	1.75E-04	1.60E-03	1.62E-03	1.61E-03	47.78	15	N/A	0.10	1.04E+01	1.60E-03	6.45E+02	6.32E+65	1.34E-05	N/A	N/A	3.0E-03
C9-C18	C9-C18 Aliphatics	1.75E-04	3.64E-04	3.40E-04	3.54E-04	47.78	15	3.39E+07	0.10	1.04E+01	3.64E-04	6.45E+02	4.88E+268	9.74E-06	3.30E+02	N/A	2.0E-01
C11-C22	C11-C22 Aromatics	1.75E-04	4.27E-04	4.05E-04	4.18E-04	47.78	15	6.49E+03	0.10	1.04E+01	4.27E-04	6.45E+02	7.52E+245	1.03E-05	6.66E-02	N/A	5.0E-02
C5-C8	C5-C8 Aliphatics	1.75E-04	3.84E-04	3.40E-04	3.54E-04	47.78	15	3.22E+05	0.10	1.04E+01	3.64E-04	6.45E+02	4.51E+268	9.74E-06	3.14E+01	N/A	2.0E-01
C9-C10	C9-C10 Aromatics	1.75E-04	3.69E-04	3.46E-04	3.60E-04	47.78	15	1.22E+04	0.10	1.04E+01	3.69E-04	6.45E+02	1.62E+284	9.80E-06	1.20E-01	N/A	5.0E-02
C9-C12	C9-C12 Aliphatics	1.75E-04	3.84E-04	3.40E-04	3.54E-04	47.78	15	1.11E+06	0.10	1.04E+01	3.64E-04	6.45E+02	4.67E+268	9.74E-06	1.08E+01	N/A	2.0E-01

Appendix C.4
Johnson & Ettinger Model - Results
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - RME
Southwest Prperties, Wells G&H Superfund Site, Operable Unit 2
Murphy Waste Oil

		RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:					INCREMENTAL RISK CALCULATIONS:	
		Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
71556	1,1,1-Trichloroethane	NA	NA	NA	1.33E+06	NA	NA	2.1E-06
76131	Trichloro-1,2,2-trifluoroethane, 1,1,2-	NA	NA	NA	1.70E+05	NA	NA	NA
79005	1,1,2-Trichloroethane	NA	NA	NA	4.42E+06	NA	NA	NA
75343	1,1-Dichloroethane	NA	NA	NA	5.06E+06	NA	NA	4.2E-06
75354	1,1-Dichloroethylene	NA	NA	NA	2.25E+06	NA	NA	7.0E-06
120821	1,2,4-Trichlorobenzene	NA	NA	NA	3.00E+05	NA	NA	NA
95501	1,2-Dichlorobenzene	NA	NA	NA	2.77E+07	NA	NA	NA
541731	Dichlorobenzene, 1,3-	NA	NA	NA	6.88E+04	NA	NA	NA
106467	1,4-Dichlorobenzene	NA	NA	NA	7.38E+04	NA	NA	NA
78933	Butanone, 2- (MEK)	NA	NA	NA	2.23E+08	NA	NA	NA
67641	Acetone	NA	NA	NA	1.00E+09	NA	NA	NA
71432	Benzene	NA	NA	NA	1.75E+06	NA	1.2E-10	6.2E-06
74839	Bromomethane	NA	NA	NA	1.52E+07	NA	NA	1.1E-05
75150	Carbon Disulfide	NA	NA	NA	2.67E+06	NA	NA	NA
108907	Chlorobenzene	NA	NA	NA	4.72E+05	NA	NA	2.6E-07
75003	Ethyl Chloride	NA	NA	NA	5.32E+06	NA	NA	2.7E-07
67663	Chloroform	NA	NA	NA	7.92E+06	NA	NA	NA
156592	cis-1,2-Dichloroethylene	NA	NA	NA	3.50E+06	NA	NA	7.6E-05
110827	Cyclohexane	NA	NA	NA	5.50E+04	NA	NA	NA
100414	Ethylbenzene	NA	NA	NA	1.69E+05	NA	NA	2.4E-07
98828	Isopropylbenzene	NA	NA	NA	5.60E+04	NA	NA	NA
108872	Methyl cyclohexane	NA	NA	NA	1.40E+04	NA	NA	9.3E-06
634044	Methyl-Tertiary-Butyl Ether	NA	NA	NA	5.10E+07	NA	NA	NA
75092	Methylene chloride	NA	NA	NA	1.30E+07	NA	8.2E-12	6.8E-08
127184	Tetrachloroethylene	NA	NA	NA	2.00E+05	NA	2.8E-10	NA
108883	Toluene	NA	NA	NA	5.26E+05	NA	NA	1.3E-06
156605	trans-1,2-Dichloroethylene	NA	NA	NA	6.30E+06	NA	NA	5.2E-06
79016	Trichloroethylene	NA	NA	NA	1.10E+06	NA	NA	4.1E-05
75014	Vinyl chloride	NA	NA	NA	2.76E+06	NA	2.7E-08	3.5E-04
1330207	Xylenes	NA	NA	NA	2.20E+05	NA	NA	NA
98862	Acetophenone	NA	NA	NA	6.13E+06	NA	NA	NA
91203	Naphthalene	NA	NA	NA	3.10E+04	NA	NA	4.7E-06
91576	Methylnaphthalene, 2-	NA	NA	NA	2.46E+04	NA	NA	1.5E-05
92524	Biphenyl, 1,1'-	NA	NA	NA	6.94E+03	NA	NA	NA
208968	Acenaphthylene	NA	NA	NA	3.93E+03	NA	NA	NA
83329	Acenaphthene	NA	NA	NA	4.24E+03	NA	NA	NA
86737	Fluorene	NA	NA	NA	1.90E+03	NA	NA	NA
85018	Phenanthrene	NA	NA	NA	1.28E+03	NA	NA	2.0E-06
120127	Anthracene	NA	NA	NA	4.34E+01	NA	NA	NA
C9-C18	C9-C18 Aliphatics	NA	NA	NA	1.00E+04	NA	NA	3.7E-02
C11-C22	C11-C22 Aromatics	NA	NA	NA	5.80E+06	NA	NA	3.0E-05
C5-C8	C5-C8 Aliphatics	NA	NA	NA	1.10E+07	NA	NA	3.5E-03
C9-C10	C9-C10 Aromatics	NA	NA	NA	5.10E+07	NA	NA	5.3E-05
C9-C12	C9-C12 Aliphatics	NA	NA	NA	7.00E+04	NA	NA	1.2E-03

	95% UCL Cancer Risk	95% UCL HI
TOTAL:	3E-08	4E-02

[ ] = Cancer risk > 1E-05 or HQ/HI>1E+00

END

Appendix C.4
Johnson & Ettinger Model - Data Entry Screen
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - CT
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Murphy Waste Oil

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	Chemical	ENTER 95% UCL groundwater conc., C_w (µg/L)	ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, LWT (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_s (°C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR Note	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Exposure time ET (hrs/day)	ENTER Coversion factor CF (hr/yr)
71556	1,1,1-Trichloroethane	5.27E+01	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
76131	Trichloro-1,2,2-trifluoroethane, 1,1,2-		15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
79005	1,1,2-Trichloroethane		15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
75343	1,1-Dichloroethane	7.24E+01	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
75354	1,1-Dichloroethylene	9.00E+00	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
120821	1,2,4-Trichlorobenzene		15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
95501	1,2-Dichlorobenzene	1.00E+00	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
541731	Dichlorobenzene, 1,3-		15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
106467	1,4-Dichlorobenzene		15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
78933	Butanone, 2- (MEK)		15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
67641	Acetone	2.42E+01	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
71432	Benzene	6.54E+00	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
74839	Bromomethane	1.00E+00	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
75150	Carbon Disulfide		15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
108907	Chlorobenzene	1.00E+00	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
75003	Ethyl Chloride	3.05E+01	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
67663	Chloroform		15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
156592	cis-1,2-Dichloroethylene	7.43E+02	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
110827	Cyclohexane		15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
100414	Ethylbenzene	7.61E+00	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
98828	Isopropylbenzene		15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
108872	Methyl cyclohexane	7.00E+00	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
1634044	Methyl-Tertiary-Butyl Ether		15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
75092	Methylene chloride	1.56E+01	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
127184	Tetrachloroethylene	7.00E+00	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
108883	Toluene	1.71E+01	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
156605	trans-1,2-Dichloroethylene	1.26E+01	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
79016	Trichloroethylene	3.31E+01	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
75014	Vinyl chloride	1.85E+02	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
1330207	Xylenes		15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
98862	Acetophenone		15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
91203	Naphthalene	9.09E+00	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
91576	Methylnaphthalene, 2-	5.68E+00	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
92524	Biphenyl, 1,1-		15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
208968	Acenaphthylene		15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
83329	Acenaphthene		15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
86737	Fluorene		15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
85018	Phenanthrene	9.74E+00	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
120127	Anthracene		15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
C9-C18	C9-C18 Aliphatics	9.51E+02	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
C11-C22	C11-C22 Aromatics	4.19E+02	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
C5-C8	C5-C8 Aliphatics	1.15E+02	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
C9-C10	C9-C10 Aromatics	7.18E+01	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
C9-C12	C9-C12 Aliphatics	3.39E+01	15	62.78	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760

Note:
1) Default soil parameters from table 7 of User's Guide for Evaluating Subsurface Vapor Intrusion into Building (U.S. EPA June 19, 2003) were used for soil water filled porosity (θ_{ws}), soil organic carbon fraction (f_{oc}), soil total porosity (n), and soil dry bulk density (ρ_b).

Appendix C.4
Johnson & Ettinger Model - Chemical Properties Screen
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - CT
Southwest Prperties, Wells G&H Superfund Site, Operable Unit 2
Murphy Waste Oil

Chemical CAS No.	Chemical	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
71556	1,1,1-Trichloroethane	7.80E-02	8.80E-06	1.72E-02	25	7,136	347.24	545.00	1.10E+02	1.33E+03	N/A	2.2E+00
76131	Trichloro-1,2,2-trifluoroethane, 1,	2.88E-02	8.07E-06	5.17E-01	25	1,326	320.70	481.05	2.25E+02	1.70E+02	N/A	3.0E+01
79005	1,1,2-Trichloroethane	7.80E-02	8.80E-06	9.12E-04	25	8,322	386.15	602.00	5.01E+01	4.42E+03	1.6E-05	2.2E+00
75343	1,1-Dichloroethane	7.42E-02	1.05E-05	5.61E-03	25	6,895	330.55	523.00	3.16E+01	5.06E+03	N/A	5.0E-01
75354	1,1-Dichloroethylene	9.00E-02	1.04E-05	2.61E-02	25	6,247	304.75	576.05	5.89E+01	2.25E+03	N/A	2.0E-01
120821	1,2,4-Trichlorobenzene	3.00E-02	8.23E-06	1.42E-03	25	10,471	486.15	725.00	1.78E+03	3.00E+02	N/A	2.0E-01
95501	1,2-Dichlorobenzene	6.88E-02	9.41E-06	1.62E-06	25	1,223	465.00	697.50	5.34E+01	2.77E+04	N/A	N/A
541731	Dichlorobenzene, 1,3-	4.14E-02	8.85E-06	4.70E-03	25	1,242	446.00	683.96	1.70E+02	6.88E+01	N/A	N/A
106467	1,4-Dichlorobenzene	6.90E-02	7.90E-06	2.43E-03	25	9,271	447.21	684.75	6.17E+02	7.38E+01	N/A	8.0E-01
78933	Butanone, 2- (MEK)	8.08E-02	9.80E-06	5.60E-05	25	1,311	352.50	528.75	3.83E+00	2.23E+05	N/A	N/A
67641	Acetone	1.24E-01	1.14E-05	3.88E-05	25	6,955	329.20	508.10	5.75E-01	1.00E+06	N/A	N/A
71432	Benzene	8.80E-02	9.80E-06	5.56E-03	25	7,342	353.24	562.16	5.89E+01	1.75E+03	7.8E-06	3.0E-02
74839	Bromomethane	7.28E-02	1.21E-05	6.22E-03	25	1,362	276.50	414.75	1.43E+01	1.52E+04	N/A	5.0E-03
75150	Carbon Disulfide	1.04E-01	1.29E-05	1.27E-02	25	6,391	319.00	552.00	5.14E+01	2.67E+03	N/A	7.0E-01
108907	Chlorobenzene	7.30E-02	8.70E-06	3.71E-03	25	8,410	404.87	632.40	2.19E+02	4.72E+02	N/A	6.0E-02
75003	Ethyl Chloride	1.26E-01	6.50E-06	8.67E-03	25	1,355	249.00	373.50	1.43E+01	5.32E+03	N/A	1.0E+01
67663	Chloroform	1.04E-01	1.00E-05	3.66E-03	25	6,988	334.32	536.40	3.98E+01	7.92E+03	2.3E-05	5.0E-02
156592	cis-1,2-Dichloroethylene	7.36E-02	1.13E-05	4.07E-03	25	7,192	333.65	544.00	3.55E+01	3.50E+03	N/A	2.0E-01
110827	Cyclohexane	8.00E-02	9.00E-06	2.00E+00	25	1,309	353.85	530.78	1.60E+02	5.50E+01	#N/A	#N/A
100414	Ethylbenzene	7.50E-02	7.80E-06	7.88E-03	25	8,501	409.34	617.20	3.63E+02	1.69E+02	N/A	1.0E+00
98828	Isopropylbenzene	6.50E-02	7.83E-06	1.47E-02	25	1,259	425.40	631.01	9.31E+03	5.60E+01	N/A	4.0E-01
108872	Methyl cyclohexane	9.86E-02	8.52E-06	4.23E-01	25	1,296	373.90	560.85	2.68E+02	1.40E+01	N/A	3.0E+00
1634044	Methyl-Tertiary-Butyl Ether	1.02E-01	1.05E-05	5.87E-04	25	1,324	328.36	497.11	3.84E+01	5.10E+04	N/A	3.0E+00
75092	Methylene chloride	1.01E-01	1.17E-05	2.19E-03	25	6,706	313.00	510.00	1.17E+01	1.30E+04	4.7E-07	3.0E+00
127184	Tetrachloroethylene	7.20E-02	8.20E-06	1.84E-02	25	8,288	394.40	620.20	1.55E+02	2.00E+02	5.9E-06	N/A
108883	Toluene	8.70E-02	8.60E-06	6.63E-03	25	7,930	383.78	591.79	1.82E+02	5.26E+02	N/A	4.0E-01
156605	trans-1,2-Dichloroethylene	7.07E-02	1.19E-05	9.39E-03	25	1,333	320.85	516.50	5.25E+01	6.30E+03	N/A	2.0E-01
79016	Trichloroethylene	7.90E-02	9.10E-06	1.03E-02	25	7,505	360.36	544.20	1.66E+02	1.10E+03	1.1E-04	4.0E-02
75014	Vinyl chloride	1.06E-01	1.23E-05	2.71E-02	25	5,250	259.25	432.00	1.86E+01	2.76E+03	8.8E-06	1.0E-01
1330207	Xylenes	7.69E-02	8.44E-06	6.73E-06	25	1,264	417.40	616.21	2.41E+02	2.20E+02	N/A	1.0E-01
98862	Acetophenone	6.00E-02	8.73E-06	1.02E-05	25	1,214	475.00	712.50	4.62E+01	6.13E+03	N/A	N/A
91203	Naphthalene	5.90E-02	7.50E-06	4.83E-04	25	10,373	491.14	748.40	2.00E+03	3.10E+01	N/A	3.0E-03
91576	Methylnaphthalene, 2-	4.84E-02	7.75E-06	1.01E-03	25	1,169	514.05	761.01	8.51E+03	2.46E+01	N/A	3.0E-03
92524	Biphenyl, 1,1'-	4.04E-02	8.15E-06	3.03E-04	25	1,149	529.10	793.65	6.25E+03	6.94E+00	N/A	N/A
208968	Acenaphthylene	4.43E-02	7.44E-06	2.80E-04	25	1,118	553.00	792.01	4.79E+03	3.93E+00	N/A	3.0E-03
83329	Acenaphthene	4.21E-02	7.69E-06	1.55E-04	25	12,155	550.54	803.15	7.08E+03	4.24E+00	N/A	3.0E-03
86737	Fluorene	3.63E-02	7.88E-06	9.41E-08	25	12,666	570.44	870.00	7.71E+03	1.90E+00	N/A	3.0E-03
85018	Phenanthrene	3.30E-02	7.47E-06	1.30E-04	25	1,057	613.00	869.01	1.41E+04	1.28E+00	N/A	3.0E-03
120127	Anthracene	3.24E-02	7.74E-06	6.51E-05	25	13,121	615.18	873.00	2.95E+04	4.34E-02	N/A	3.0E-03
C9-C18	C9-C18 Aliphatics	6.00E-02	1.00E-05	1.66E+00	25	NA	NA	NA	6.80E+05	1.00E+01	N/A	2.0E-01
C11-C22	C11-C22 Aromatics	6.00E-02	1.00E-05	7.32E-04	25	NA	NA	NA	5.00E+03	5.80E+03	N/A	5.0E-02
C5-C8	C5-C8 Aliphatics	6.00E-02	1.00E-05	1.30E+00	25	NA	NA	NA	2.27E+03	1.10E+04	N/A	2.0E-01
C9-C10	C9-C10 Aromatics	6.00E-02	1.00E-05	7.92E-03	25	NA	NA	NA	1.78E+03	5.10E+04	N/A	5.0E-02
C9-C12	C9-C12 Aliphatics	6.00E-02	1.00E-05	1.56E+00	25	NA	NA	NA	1.50E+05	7.00E+01	N/A	2.0E-01

Appendix C.4
Johnson & Ettinger Model - Calculations Screen
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - CT
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Murphy Waste Oil

		Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone soil effective total fluid saturation, S_{we} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, Xcrack (cm)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} ($atm-m^3/mol$)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)
71556	1,1,1-Trichloroethane	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	7,885	8.50E-03	3.66E-01
76131	Trichloro-1,2,2-trifluoroethane, 1,1,2-	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1,438	4.55E-01	1.96E+01
79005	1,1,2-Trichloroethane	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	8,572	3.88E-04	1.67E-02
75343	1,1-Dichloroethane	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	7,450	2.88E-03	1.24E-01
75354	1,1-Dichloroethylene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	6,392	1.47E-02	6.34E-01
120821	1,2,4-Trichlorobenzene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	13,230	4.35E-04	1.87E-02
95501	1,2-Dichlorobenzene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1,521	1.41E-06	6.09E-05
541731	Dichlorobenzene, 1,3-	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1,503	4.11E-03	1.77E-01
106467	1,4-Dichlorobenzene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	11,243	8.89E-04	3.83E-02
78933	Butanone, 2- (MEK)	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1,486	4.90E-05	2.11E-03
67641	Acetone	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	7,559	1.97E-05	8.50E-04
71432	Benzene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	8,122	2.69E-03	1.16E-01
74839	Bromomethane	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1,337	5.52E-03	2.38E-01
75150	Carbon Disulfide	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	6,682	6.99E-03	3.01E-01
108907	Chlorobenzene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	9,603	1.54E-03	6.65E-02
75003	Ethyl Chloride	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1,201	7.79E-03	3.35E-01
67663	Chloroform	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	7,554	1.86E-03	8.02E-02
156592	cis-1,2-Dichloroethylene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	7,734	2.04E-03	8.77E-02
110827	Cyclohexane	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1,486	1.75E+00	7.54E+01
100414	Ethylbenzene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	10,155	3.18E-03	1.37E-01
98828	Isopropylbenzene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1,540	1.28E-02	5.51E-01
108872	Methyl cyclohexane	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1,505	3.70E-01	1.59E+01
1634044	Methyl-Tertiary-Butyl Ether	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1,447	5.16E-04	2.22E-02
75092	Methylene chloride	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	7,034	1.17E-03	5.03E-02
127184	Tetrachloroethylene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	9,553	7.93E-03	3.37E-01
108883	Toluene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	9,154	2.92E-03	1.26E-01
156605	trans-1,2-Dichloroethylene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1,417	8.27E-03	3.56E-01
79016	Trichloroethylene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	8,557	4.78E-03	2.06E-01
75014	Vinyl chloride	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	5,000	1.73E-02	7.46E-01
1330207	Xylenes	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1,542	5.86E-06	2.52E-04
98862	Acetophenone	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1,518	8.91E-06	3.83E-04
91203	Naphthalene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	12,913	1.52E-04	6.55E-03
91576	Methylnaphthalene, 2-	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1,506	8.86E-04	3.81E-02
92524	Biphenyl, 1,1'-	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1,472	2.66E-04	1.14E-02
208968	Acenaphthylene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1,513	2.45E-04	1.05E-02
83329	Acenaphthene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	16,123	3.67E-05	1.58E-03
86737	Fluorene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	16,235	2.20E-06	9.45E-05
85018	Phenanthrene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	1,479	1.14E-04	4.90E-03
120127	Anthracene	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	18,353	1.26E-05	5.43E-04
C9-C18	C9-C18 Aliphatics	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	NA	8.26E-01	3.55E+01
C11-C22	C11-C22 Aromatics	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	NA	3.60E-04	1.55E-02
C5-C8	C5-C8 Aliphatics	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	NA	6.46E-01	2.79E+01
C9-C10	C9-C10 Aromatics	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	NA	3.96E-03	1.70E-01
C9-C12	C9-C12 Aliphatics	47.78	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	6.55E+03	6.93E+05	2.60E+06	2.48E-04	15	NA	7.80E-01	3.36E+01

Appendix C.4
Johnson & Ettinger Model - Calculations Screen
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - CT
Southwest Properties, Wells G&H Superfund Site, Open
Murphy Waste Oil

		Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_v (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe') (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
71556	1,1,1-Trichloroethane	1.75E-04	4.75E-04	4.46E-04	4.63E-04	47.78	15	1.93E+04	0.10	1.04E+01	4.75E-04	6.45E+02	9.58E+220	1.06E-05	2.05E-01	N/A	2.2E+00
76131	Trichloro-1,2,2-trifluoroethane, 1,1,2-	1.75E-04	1.75E-04	1.63E-04	1.70E-04	47.78	15	N/A	0.10	1.04E+01	1.75E-04	6.45E+02	#NUM!	7.06E-06	N/A	N/A	3.0E+01
79005	1,1,2-Trichloroethane	1.75E-04	5.24E-04	4.95E-04	5.13E-04	47.78	15	N/A	0.10	1.04E+01	5.24E-04	6.45E+02	1.44E+200	1.03E-05	N/A	1.6E-05	2.2E+00
75343	1,1-Dichloroethane	1.75E-04	4.58E-04	4.29E-04	4.46E-04	47.78	15	8.87E+03	0.10	1.04E+01	4.58E-04	6.45E+02	1.57E+229	1.05E-05	9.43E-02	N/A	5.0E-01
75354	1,1-Dichloroethylene	1.75E-04	5.47E-04	5.12E-04	5.33E-04	47.78	15	5.71E+03	0.10	1.04E+01	5.47E-04	6.45E+02	8.08E+191	1.10E-05	6.30E-02	N/A	2.0E-01
120821	1,2,4-Trichlorobenzene	1.75E-04	2.25E-04	2.14E-04	2.21E-04	47.78	15	N/A	0.10	1.04E+01	2.25E-04	6.45E+02	#NUM!	8.04E-06	N/A	N/A	2.0E-01
95501	1,2-Dichlorobenzene	1.75E-04	1.56E-02	1.60E-02	1.58E-02	47.78	15	8.09E-02	0.10	1.04E+01	1.56E-02	6.45E+02	5.40E+06	1.48E-05	9.02E-07	N/A	N/A
541731	Dichlorobenzene, 1,3-	1.75E-04	2.56E-04	2.40E-04	2.49E-04	47.78	15	N/A	0.10	1.04E+01	2.56E-04	6.45E+02	#NUM!	8.49E-06	N/A	N/A	N/A
106467	1,4-Dichlorobenzene	1.75E-04	4.38E-04	4.12E-04	4.28E-04	47.78	15	N/A	0.10	1.04E+01	4.38E-04	6.45E+02	2.63E+239	1.04E-05	N/A	N/A	8.0E-01
78933	Butanone, 2- (MEK)	1.75E-04	9.45E-04	9.27E-04	9.38E-04	47.78	15	N/A	0.10	1.04E+01	9.45E-04	6.45E+02	1.09E+111	1.25E-05	N/A	N/A	N/A
67641	Acetone	1.75E-04	2.07E-03	2.06E-03	2.06E-03	47.78	15	2.06E+01	0.10	1.04E+01	2.07E-03	6.45E+02	5.63E+50	1.37E-05	2.83E-04	N/A	N/A
71432	Benzene	1.75E-04	5.42E-04	5.07E-04	5.28E-04	47.78	15	7.57E+02	0.10	1.04E+01	5.42E-04	6.45E+02	6.73E+193	1.10E-05	8.34E-03	7.8E-06	3.0E-02
74839	Bromomethane	1.75E-04	4.46E-04	4.18E-04	4.35E-04	47.78	15	2.38E+02	0.10	1.04E+01	4.46E-04	6.45E+02	1.91E+235	1.04E-05	2.47E-03	N/A	5.0E-03
75150	Carbon Disulfide	1.75E-04	6.34E-04	5.94E-04	6.18E-04	47.78	15	N/A	0.10	1.04E+01	6.34E-04	6.45E+02	2.87E+165	1.15E-05	N/A	N/A	7.0E-01
108907	Chlorobenzene	1.75E-04	4.58E-04	4.27E-04	4.44E-04	47.78	15	6.65E+01	0.10	1.04E+01	4.58E-04	6.45E+02	3.97E+230	1.05E-05	6.97E-04	N/A	6.0E-02
75003	Ethyl Chloride	1.75E-04	7.66E-04	7.16E-04	7.45E-04	47.78	15	1.02E+04	0.10	1.04E+01	7.66E-04	6.45E+02	1.38E+137	1.19E-05	1.22E-01	N/A	1.0E+01
67663	Chloroform	1.75E-04	6.43E-04	6.02E-04	6.26E-04	47.78	15	N/A	0.10	1.04E+01	6.43E-04	6.45E+02	2.45E+163	1.15E-05	N/A	2.3E-05	5.0E-02
156592	cis-1,2-Dichloroethylene	1.75E-04	4.59E-04	4.30E-04	4.47E-04	47.78	15	6.52E+04	0.10	1.04E+01	4.59E-04	6.45E+02	7.49E+226	1.05E-05	6.85E-01	N/A	2.0E-01
110827	Cyclohexane	1.75E-04	4.85E-04	4.53E-04	4.72E-04	47.78	15	N/A	0.10	1.04E+01	4.85E-04	6.45E+02	3.37E+216	1.07E-05	N/A	#N/A	#N/A
100414	Ethylbenzene	1.75E-04	4.60E-04	4.31E-04	4.48E-04	47.78	15	1.04E+03	0.10	1.04E+01	4.60E-04	6.45E+02	1.44E+228	1.05E-05	1.09E-02	N/A	1.0E+00
98828	Isopropylbenzene	1.75E-04	3.95E-04	3.70E-04	3.85E-04	47.78	15	N/A	0.10	1.04E+01	3.95E-04	6.45E+02	3.75E+265	1.00E-05	N/A	N/A	4.0E-01
108872	Methyl cyclohexane	1.75E-04	5.98E-04	5.58E-04	5.82E-04	47.78	15	1.11E+05	0.10	1.04E+01	5.98E-04	6.45E+02	4.68E+175	1.13E-05	1.26E+00	N/A	3.0E+00
1634044	Methyl-Tertiary-Butyl Ether	1.75E-04	6.67E-04	6.25E-04	6.51E-04	47.78	15	N/A	0.10	1.04E+01	6.67E-04	6.45E+02	2.47E+157	1.16E-05	N/A	N/A	3.0E+00
75092	Methylene chloride	1.75E-04	6.35E-04	5.95E-04	6.19E-04	47.78	15	7.98E+02	0.10	1.04E+01	6.35E-04	6.45E+02	2.18E+163	1.15E-05	9.14E-03	4.7E-07	3.0E+00
127184	Tetrachloroethylene	1.75E-04	4.39E-04	4.11E-04	4.27E-04	47.78	15	2.36E+03	0.10	1.04E+01	4.39E-04	6.45E+02	1.82E+239	1.04E-05	2.45E-02	5.9E-06	N/A
108883	Toluene	1.75E-04	5.34E-04	5.00E-04	5.20E-04	47.78	15	2.16E+03	0.10	1.04E+01	5.34E-04	6.45E+02	4.07E+196	1.10E-05	2.37E-02	N/A	4.0E-01
156605	trans-1,2-Dichloroethylene	1.75E-04	4.32E-04	4.04E-04	4.20E-04	47.78	15	4.55E+03	0.10	1.04E+01	4.32E-04	6.45E+02	1.43E+243	1.03E-05	4.66E-02	N/A	2.0E-01
79016	Trichloroethylene	1.75E-04	4.83E-04	4.52E-04	4.70E-04	47.78	15	6.83E+03	0.10	1.04E+01	4.83E-04	6.45E+02	2.03E+217	1.07E-05	7.28E-02	1.1E-04	4.0E-02
75014	Vinyl chloride	1.75E-04	6.44E-04	6.02E-04	6.27E-04	47.78	15	1.39E+05	0.10	1.04E+01	6.44E-04	6.45E+02	1.02E+163	1.15E-05	1.59E+00	8.8E-06	1.0E-01
1330207	Xylenes	1.75E-04	3.75E-03	3.81E-03	3.77E-03	47.78	15	N/A	0.10	1.04E+01	3.75E-03	6.45E+02	1.01E+28	1.43E-05	N/A	N/A	1.0E-01
98862	Acetophenone	1.75E-04	2.60E-03	2.64E-03	2.62E-03	47.78	15	N/A	0.10	1.04E+01	2.60E-03	6.45E+02	2.46E+40	1.40E-05	N/A	N/A	N/A
91203	Naphthalene	1.75E-04	4.70E-04	4.50E-04	4.62E-04	47.78	15	5.95E+01	0.10	1.04E+01	4.70E-04	6.45E+02	2.56E+223	1.06E-05	6.32E-04	N/A	3.0E-03
91576	Methylnaphthalene, 2-	1.75E-04	3.13E-04	2.95E-04	3.06E-04	47.78	15	2.24E+02	0.10	1.04E+01	3.13E-04	6.45E+02	#NUM!	9.23E-06	2.07E-03	N/A	3.0E-03
92524	Biphenyl, 1,1'-	1.75E-04	3.15E-04	3.01E-04	3.09E-04	47.78	15	N/A	0.10	1.04E+01	3.15E-04	6.45E+02	#NUM!	9.27E-06	N/A	N/A	N/A
208968	Acenaphthylene	1.76E-04	3.38E-04	3.22E-04	3.31E-04	47.78	15	N/A	0.10	1.04E+01	3.38E-04	6.45E+02	#NUM!	8.51E-06	N/A	N/A	3.0E-03
83329	Acenaphthene	1.75E-04	7.33E-04	7.31E-04	7.32E-04	47.78	15	N/A	0.10	1.04E+01	7.33E-04	6.45E+02	1.38E+143	1.19E-05	N/A	N/A	3.0E-03
86737	Fluorene	1.75E-04	8.16E-01	8.39E-01	8.25E-01	47.78	15	N/A	0.10	1.04E+01	8.16E-01	6.45E+02	1.34E+00	5.84E-05	N/A	N/A	3.0E-03
85018	Phenanthrene	1.75E-04	3.50E-04	3.41E-04	3.46E-04	47.78	15	2.61E+01	0.10	1.04E+01	3.50E-04	6.45E+02	2.10E+300	9.68E-06	2.72E-04	N/A	3.0E-03
120127	Anthracene	1.75E-04	1.60E-03	1.62E-03	1.61E-03	47.78	15	N/A	0.10	1.04E+01	1.60E-03	6.45E+02	6.32E+65	1.34E-05	N/A	N/A	3.0E-03
C8-C16	C8-C16 Aliphatics	1.75E-04	3.64E-04	3.40E-04	3.54E-04	47.78	15	3.39E+07	0.10	1.04E+01	3.64E-04	6.45E+02	4.85E+258	9.74E-06	3.30E+02	N/A	2.0E-01
C11-C22	C11-C22 Aromatics	1.75E-04	4.27E-04	4.05E-04	4.18E-04	47.78	15	6.49E+03	0.10	1.04E+01	4.27E-04	6.45E+02	7.52E+245	1.03E-05	6.86E-02	N/A	5.0E-02
C5-C8	C5-C8 Aliphatics	1.75E-04	3.64E-04	3.40E-04	3.54E-04	47.78	15	3.22E+06	0.10	1.04E+01	3.64E-04	6.45E+02	4.81E+258	9.74E-06	3.14E+01	N/A	2.0E-01
C9-C10	C9-C10 Aromatics	1.75E-04	3.68E-04	3.46E-04	3.60E-04	47.78	15	1.22E+04	0.10	1.04E+01	3.68E-04	6.45E+02	1.62E+264	9.80E-06	1.20E-01	N/A	6.0E-02
C9-C12	C9-C12 Aliphatics	1.75E-04	3.64E-04	3.40E-04	3.54E-04	47.78	15	1.11E+06	0.10	1.04E+01	3.64E-04	6.45E+02	4.87E+258	9.74E-06	1.08E+01	N/A	2.0E-01

Appendix C.4
Johnson & Ettinger Model - Results
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - CT
Southwest Prperties, Wells G&H Superfund Site, Operable Unit 2
Murphy Waste Oil

		RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:					INCREMENTAL RISK CALCULATIONS:	
		Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
71556	1,1,1-Trichloroethane	NA	NA	NA	1.33E+06	NA	NA	6.9E-07
76131	Trichloro-1,2,2-triflouroethane, 1,1,2-	NA	NA	NA	1.70E+05	NA	NA	NA
79005	1,1,2-Trichloroethane	NA	NA	NA	4.42E+06	NA	NA	NA
75343	1,1-Dichloroethane	NA	NA	NA	5.06E+06	NA	NA	1.4E-06
75354	1,1-Dichloroethylene	NA	NA	NA	2.25E+06	NA	NA	2.3E-06
120821	1,2,4-Trichlorobenzene	NA	NA	NA	3.00E+05	NA	NA	NA
95501	1,2-Dichlorobenzene	NA	NA	NA	2.77E+07	NA	NA	NA
541731	Dichlorobenzene, 1,3-	NA	NA	NA	6.88E+04	NA	NA	NA
106467	1,4-Dichlorobenzene	NA	NA	NA	7.38E+04	NA	NA	NA
78933	Butanone, 2- (MEK)	NA	NA	NA	2.23E+08	NA	NA	NA
67641	Acetone	NA	NA	NA	1.00E+09	NA	NA	NA
71432	Benzene	NA	NA	NA	1.75E+06	NA	1.4E-11	2.1E-06
74839	Bromomethane	NA	NA	NA	1.52E+07	NA	NA	3.7E-06
75150	Carbon Disulfide	NA	NA	NA	2.67E+06	NA	NA	NA
108907	Chlorobenzene	NA	NA	NA	4.72E+05	NA	NA	8.6E-08
75003	Ethyl Chloride	NA	NA	NA	5.32E+06	NA	NA	9.0E-08
67663	Chloroform	NA	NA	NA	7.92E+06	NA	NA	NA
156592	cis-1,2-Dichloroethylene	NA	NA	NA	3.50E+06	NA	NA	2.5E-05
110827	Cyclohexane	NA	NA	NA	5.50E+04	NA	NA	NA
100414	Ethylbenzene	NA	NA	NA	1.69E+05	NA	NA	8.1E-08
98828	Isopropylbenzene	NA	NA	NA	5.60E+04	NA	NA	NA
108872	Methyl cyclohexane	NA	NA	NA	1.40E+04	NA	NA	3.1E-06
1634044	Methyl-Tertiary-Butyl Ether	NA	NA	NA	5.10E+07	NA	NA	NA
75092	Methylene chloride	NA	NA	NA	1.30E+07	NA	9.1E-13	2.3E-08
127184	Tetrachloroethylene	NA	NA	NA	2.00E+05	NA	3.1E-11	NA
108883	Toluene	NA	NA	NA	5.26E+05	NA	NA	4.4E-07
156605	trans-1,2-Dichloroethylene	NA	NA	NA	6.30E+06	NA	NA	1.7E-06
79016	Trichloroethylene	NA	NA	NA	1.10E+06	NA	1.7E-09	1.4E-05
75014	Vinyl chloride	NA	NA	NA	2.76E+06	NA	3.0E-09	1.2E-04
1330207	Xylenes	NA	NA	NA	2.20E+05	NA	NA	NA
98862	Acetophenone	NA	NA	NA	6.13E+06	NA	NA	NA
91203	Naphthalene	NA	NA	NA	3.10E+04	NA	NA	1.6E-06
91576	Methylnaphthalene, 2-	NA	NA	NA	2.46E+04	NA	NA	5.1E-06
92524	Biphenyl, 1,1'-	NA	NA	NA	6.94E+03	NA	NA	NA
208968	Acenaphthylene	NA	NA	NA	3.93E+03	NA	NA	NA
83329	Acenaphthene	NA	NA	NA	4.24E+03	NA	NA	NA
86737	Fluorene	NA	NA	NA	1.90E+03	NA	NA	NA
85018	Phenanthrene	NA	NA	NA	1.28E+03	NA	NA	6.7E-07
120127	Anthracene	NA	NA	NA	4.34E+01	NA	NA	NA
C9-C18	C9-C18 Aliphatics	NA	NA	NA	1.00E+04	NA	NA	1.2E-02
C11-C22	C11-C22 Aromatics	NA	NA	NA	5.80E+06	NA	NA	9.9E-06
C5-C8	C5-C8 Aliphatics	NA	NA	NA	1.10E+07	NA	NA	1.2E-03
C9-C10	C9-C10 Aromatics	NA	NA	NA	5.10E+07	NA	NA	1.8E-05
C9-C12	C9-C12 Aliphatics	NA	NA	NA	7.00E+04	NA	NA	4.0E-04

	95% UCL Cancer Risk	95% UCL HI
TOTAL:	5E-09	1E-02

[ ] = Cancer risk > 1E-05 or HQ/HI>1E+00

END

Appendix C.4
Johnson & Ettinger Model - Data Entry Screen
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - RME
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Aberdeen Auto Parts

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	Chemical	Enter Initial groundwater conc., C_{gw} (µg/L)	ENTER 95% UCL groundwater conc., C_{gw} (µg/L)	ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, LWT (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_s (°C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR Note	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Exposure time ET (hrs/day)	ENTER Conversion factor CF (hrs/yr)
71556	1,1,1-Trichloroethane			15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
76131	Trichloro-1,2,2-trifluoroethane, 1,1,2-			15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
79005	1,1,2-Trichloroethane			15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
75343	1,1-Dichloroethene			15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
75354	1,1-Dichloroethylene		1.06E-01	15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
120821	1,2,4-Trichlorobenzene			15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
95501	1,2-Dichlorobenzene			15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
541731	Dichlorobenzene, 1,3-			15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
106467	1,4-Dichlorobenzene		4.69E-01	15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
78933	Butanone, 2- (MEK)			15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
67641	Acetone			15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
71432	Benzene		2.81E-01	15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
74839	Bromomethane			15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
75150	Carbon Disulfide			15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
108907	Chlorobenzene			15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
75003	Ethyl Chloride			15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
67663	Chloroform			15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
156592	cis-1,2-Dichloroethylene		2.90E+01	15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
110827	Cyclohexane			15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
100414	Ethylbenzene			15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
98828	Isopropylbenzene			15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
108872	Methyl cyclohexane			15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
1634044	Methyl-Tertiary-Butyl Ether		1.40E+01	15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
75092	Methylene chloride			15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
127184	Tetrachloroethylene		4.18E-01	15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
108883	Toluene			15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
156605	trans-1,2-Dichloroethylene			15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
79016	Trichloroethylene		2.50E+01	15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
75014	Vinyl chloride		2.17E-01	15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
1330207	Xylenes			15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
98862	Acetophenone			15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
91203	Naphthalene		2.70E+00	15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
91576	Methylnaphthalene, 2-			15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
92524	Biphenyl, 1,1'-			15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
208968	Acenaphthylene			15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
83329	Acenaphthene			15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
86737	Fluorene			15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
85018	Phenanthrene		2.10E+00	15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
120127	Anthracene			15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
C9-C18	C9-C18 Aliphatics			15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
C11-C22	C11-C22 Aromatics			15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
C5-C8	C5-C8 Aliphatics			15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
C9-C10	C9-C10 Aromatics			15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760
C9-C12	C9-C12 Aliphatics			15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	6	6	78	2.5	8760

Note:
1) Default soil parameters from table 7 of User's Guide for Evaluating Subsurface Vapor Intrusion into Building (U.S. EPA June 19, 2003) were used for soil water filled porosity (θ_w), soil organic carbon fraction (f_{oc}), soil total porosity (n), and soil dry bulk density (ρ_b).

Appendix C.4
Johnson & Ettinger Model - Chemical Properties Screen
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - RME
Southwest Prperties, Wells G&H Superfund Site, Operable Unit 2
Aberjona Auto Parts

Chemical CAS No.	Chemical	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
71556	1,1,1-Trichloroethane	7.80E-02	8.80E-06	1.72E-02	25	7,136	347.24	545.00	1.10E+02	1.33E+03	N/A	2.2E+00
76131	Trichloro-1,2,2-triflouroethane, 1,	2.88E-02	8.07E-06	5.17E-01	25	1,326	320.70	481.05	2.25E+02	1.70E+02	N/A	3.0E+01
79005	1,1,2-Trichloroethane	7.80E-02	8.80E-06	9.12E-04	25	8,322	386.15	602.00	5.01E+01	4.42E+03	1.6E-05	2.2E+00
75343	1,1-Dichloroethane	7.42E-02	1.05E-05	5.61E-03	25	6,895	330.55	523.00	3.16E+01	5.06E+03	N/A	5.0E-01
75354	1,1-Dichloroethylene	9.00E-02	1.04E-05	2.61E-02	25	6,247	304.75	576.05	5.89E+01	2.25E+03	N/A	2.0E-01
120821	1,2,4-Trichlorobenzene	3.00E-02	8.23E-06	1.42E-03	25	10,471	486.15	725.00	1.78E+03	3.00E+02	N/A	2.0E-01
95501	1,2-Dichlorobenzene	6.88E-02	9.41E-06	1.62E-06	25	1,223	465.00	697.50	5.34E+01	2.77E+04	N/A	N/A
541731	Dichlorobenzene, 1,3-	4.14E-02	8.85E-06	4.70E-03	25	1,242	446.00	683.96	1.70E+02	6.88E+01	N/A	N/A
106467	1,4-Dichlorobenzene	6.90E-02	7.90E-06	2.43E-03	25	9,271	447.21	684.75	6.17E+02	7.38E+01	N/A	8.0E-01
78933	Butanone, 2- (MEK)	8.08E-02	9.80E-06	5.60E-05	25	1,311	352.50	528.75	3.83E+00	2.23E+05	N/A	N/A
67641	Acetone	1.24E-01	1.14E-05	3.88E-05	25	6,955	329.20	508.10	5.75E-01	1.00E+06	N/A	N/A
71432	Benzene	8.80E-02	9.80E-06	5.56E-03	25	7,342	353.24	562.16	5.89E+01	1.75E+03	7.8E-06	3.0E-02
74839	Bromomethane	7.28E-02	1.21E-05	6.22E-03	25	1,362	276.50	414.75	1.43E+01	1.52E+04	N/A	5.0E-03
75150	Carbon Disulfide	1.04E-01	1.29E-05	1.27E-02	25	6,391	319.00	552.00	5.14E+01	2.67E+03	N/A	7.0E-01
108907	Chlorobenzene	7.30E-02	8.70E-06	3.71E-03	25	8,410	404.87	632.40	2.19E+02	4.72E+02	N/A	6.0E-02
75003	Ethyl Chloride	1.26E-01	6.50E-06	8.67E-03	25	1,355	249.00	373.50	1.43E+01	5.32E+03	N/A	1.0E+01
67663	Chloroform	1.04E-01	1.00E-05	3.66E-03	25	6,988	334.32	536.40	3.98E+01	7.92E+03	2.3E-05	5.0E-02
156592	cis-1,2-Dichloroethylene	7.36E-02	1.13E-05	4.07E-03	25	7,192	333.65	544.00	3.55E+01	3.50E+03	N/A	2.0E-01
110827	Cyclohexane	8.00E-02	9.00E-06	2.00E+00	25	1,309	353.85	530.78	1.60E+02	5.50E+01	#N/A	#N/A
100414	Ethylbenzene	7.50E-02	7.80E-06	7.88E-03	25	8,501	409.34	617.20	3.63E+02	1.69E+02	N/A	1.0E+00
98828	Isopropylbenzene	6.50E-02	7.83E-06	1.47E-02	25	1,259	425.40	631.01	9.31E+03	5.60E+01	N/A	4.0E-01
108872	Methyl cyclohexane	9.86E-02	8.52E-06	4.23E-01	25	1,296	373.90	560.85	2.68E+02	1.40E+01	N/A	3.0E+00
1634044	Methyl-Tertiary-Butyl Ether	1.02E-01	1.05E-05	5.87E-04	25	1,324	328.36	497.11	3.84E+01	5.10E+04	N/A	3.0E+00
75092	Methylene chloride	1.01E-01	1.17E-05	2.19E-03	25	6,706	313.00	510.00	1.17E+01	1.30E+04	4.7E-07	3.0E+00
127184	Tetrachloroethylene	7.20E-02	8.20E-06	1.84E-02	25	8,288	394.40	620.20	1.55E+02	2.00E+02	5.9E-06	N/A
108883	Toluene	8.70E-02	8.60E-06	6.63E-03	25	7,930	383.78	591.79	1.82E+02	5.26E+02	N/A	4.0E-01
156605	trans-1,2-Dichloroethylene	7.07E-02	1.19E-05	9.39E-03	25	1,333	320.85	516.50	5.25E+01	6.30E+03	N/A	2.0E-01
79016	Trichloroethylene	7.90E-02	9.10E-06	1.03E-02	25	7,505	360.36	544.20	1.66E+02	1.10E+03	1.1E-04	4.0E-02
75014	Vinyl chloride	1.06E-01	1.23E-05	2.71E-02	25	5,250	259.25	432.00	1.86E+01	2.76E+03	8.8E-06	1.0E-01
1330207	Xylenes	7.69E-02	8.44E-06	6.73E-06	25	1,264	417.40	616.21	2.41E+02	2.20E+02	N/A	1.0E-01
98862	Acetophenone	6.00E-02	8.73E-06	1.02E-05	25	1,214	475.00	712.50	4.62E+01	6.13E+03	N/A	N/A
91203	Naphthalene	5.90E-02	7.50E-06	4.83E-04	25	10,373	491.14	748.40	2.00E+03	3.10E+01	N/A	3.0E-03
91576	Methylnaphthalene, 2-	4.84E-02	7.75E-06	1.01E-03	25	1,169	514.05	761.01	8.51E+03	2.46E+01	N/A	3.0E-03
92524	Biphenyl, 1,1'-	4.04E-02	8.15E-06	3.03E-04	25	1,149	529.10	793.65	6.25E+03	6.94E+00	N/A	N/A
208968	Acenaphthylene	4.43E-02	7.44E-06	2.80E-04	25	1,118	553.00	792.01	4.79E+03	3.93E+00	N/A	3.0E-03
83329	Acenaphthene	4.21E-02	7.69E-06	1.55E-04	25	12,155	550.54	803.15	7.08E+03	4.24E+00	N/A	3.0E-03
86737	Fluorene	3.63E-02	7.88E-06	9.41E-08	25	12,666	570.44	870.00	7.71E+03	1.90E+00	N/A	3.0E-03
85018	Phenanthrene	3.30E-02	7.47E-06	1.30E-04	25	1,057	613.00	869.01	1.41E+04	1.28E+00	N/A	3.0E-03
120127	Anthracene	3.24E-02	7.74E-06	6.51E-05	25	13,121	615.18	873.00	2.95E+04	4.34E-02	N/A	3.0E-03
C9-C18	C9-C18 Aliphatics	6.00E-02	1.00E-05	1.66E+00	25	NA	NA	NA	6.80E+05	1.00E+01	N/A	2.0E-01
C11-C22	C11-C22 Aromatics	6.00E-02	1.00E-05	7.32E-04	25	NA	NA	NA	5.00E+03	5.80E+03	N/A	5.0E-02
C5-C8	C5-C8 Aliphatics	6.00E-02	1.00E-05	1.30E+00	25	NA	NA	NA	2.27E+03	1.10E+04	N/A	2.0E-01
C9-C10	C9-C10 Aromatics	6.00E-02	1.00E-05	7.92E-03	25	NA	NA	NA	1.78E+03	5.10E+04	N/A	5.0E-02
C9-C12	C9-C12 Aliphatics	6.00E-02	1.00E-05	1.56E+00	25	NA	NA	NA	1.50E+05	7.00E+01	N/A	2.0E-01

Appendix C.4
Johnson & Ettinger Model - Calculations Screen
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - RME
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Aberdeen Auto Parts

		Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^v (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a\,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w\,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, Xcrack (cm)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v\,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} ($atm\text{-}m^3/mol$)	Henry's law constant at ve. groundwat temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)
71556	1,1,1-Trichloroethane	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	7,886	8.50E-03	3.66E-01	1.75E-04
76131	Trichloro-1,2,2-trifluoroethane, 1,1,2-	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1,436	4.55E-01	1.96E+01	1.75E-04
79005	1,1,2-Trichloroethane	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	9,572	3.38E-04	1.67E-02	1.75E-04
75343	1,1-Dichloroethane	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	7,450	2.88E-03	1.24E-01	1.75E-04
75354	1,1-Dichloroethylene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	7,450	2.88E-03	1.24E-01	1.75E-04
120821	1,2,4-Trichlorobenzene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	6,392	1.47E-02	6.34E-01	1.75E-04
95501	1,2-Dichlorobenzene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	13,230	4.35E-04	1.87E-02	1.75E-04
541731	Dichlorobenzene, 1,3-	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1,521	1.41E-06	6.09E-05	1.75E-04
106467	1,4-Dichlorobenzene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1,503	4.11E-03	1.77E-01	1.75E-04
78933	Butanone, 2- (MEK)	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	11,243	8.89E-04	3.83E-02	1.75E-04
67641	Acetone	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1,486	4.90E-05	2.11E-03	1.75E-04
71432	Benzene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	7,569	1.97E-05	8.50E-04	1.75E-04
74839	Bromomethane	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	5,122	2.69E-03	1.16E-01	1.75E-04
75150	Carbon Disulfide	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1,337	5.52E-03	2.38E-01	1.75E-04
108907	Chlorobenzene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	6,662	6.99E-03	3.01E-01	1.75E-04
75003	Ethyl Chloride	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	9,803	1.54E-03	6.65E-02	1.75E-04
67663	Chloroform	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1,201	7.79E-03	3.35E-01	1.75E-04
156592	cis-1,2-Dichloroethylene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	7,554	1.86E-03	8.02E-02	1.75E-04
110827	Cyclohexane	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	7,734	2.04E-03	8.77E-02	1.75E-04
100414	Ethylbenzene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1,486	1.75E+00	7.54E+01	1.75E-04
98828	Isopropylbenzene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	10,155	3.18E-03	1.37E-01	1.75E-04
108872	Methyl cyclohexane	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1,540	1.28E-02	5.51E-01	1.75E-04
1634044	Methyl-Tertiary-Butyl Ether	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1,505	3.70E-01	1.59E+01	1.75E-04
75092	Methylene chloride	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1,447	5.16E-04	2.22E-02	1.75E-04
127184	Tetrachloroethylene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	7,034	1.17E-03	5.03E-02	1.75E-04
108883	Toluene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	9,553	7.63E-03	3.27E-01	1.75E-04
156605	trans-1,2-Dichloroethylene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	9,154	2.92E-03	1.26E-01	1.75E-04
79016	Trichloroethylene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1,417	8.27E-03	3.56E-01	1.75E-04
75014	Vinyl chloride	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	8,557	4.79E-03	2.06E-01	1.75E-04
1330207	Xylenes	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	5,000	1.73E-02	7.46E-01	1.75E-04
98862	Acetophenone	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1,542	5.86E-06	2.52E-04	1.75E-04
91203	Naphthalene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1,518	8.91E-06	3.83E-04	1.75E-04
91576	Methylnaphthalene, 2-	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	12,913	1.52E-04	6.55E-03	1.75E-04
92524	Biphenyl, 1,1'-	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1,506	8.85E-04	3.81E-02	1.75E-04
208968	Acenaphthylene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1,472	2.86E-04	1.14E-02	1.75E-04
83329	Acenaphthene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1,513	2.45E-04	1.05E-02	1.75E-04
86737	Fluorene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	15,123	3.67E-05	1.58E-03	1.75E-04
85018	Phenanthrene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	16,235	2.20E-06	9.46E-05	1.75E-04
120127	Anthracene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1,479	1.14E-04	4.90E-03	1.75E-04
C9-C18	C9-C18 Aliphatics	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	18,353	1.26E-05	5.43E-04	1.75E-04
C11-C22	C11-C22 Aromatics	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	NA	9.28E-01	3.99E+01	1.75E-04
C5-C8	C5-C8 Aliphatics	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	NA	3.60E-04	1.55E-02	1.75E-04
C9-C10	C9-C10 Aromatics	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	NA	6.48E-01	2.79E+01	1.75E-04
C9-C12	C9-C12 Aliphatics	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	NA	3.99E-03	1.70E-01	1.75E-04
		67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	NA	7.80E-01	3.36E+01	1.75E-04

Appendix C.4
Johnson & Ettinger Model - Calculations Screen
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - RME
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Aberjona Auto Parts

		Vadose zone effective diffusion coefficient, D^{eff}_v (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe') (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
71556	1,1,1-Trichloroethane	4.76E-04	4.45E-04	4.68E-04	67.6	15	N/A	0.10	4.79E+01	4.75E-04	3.01E+03	1.21E+218	2.36E-06	N/A	N/A	2.2E+00
76131	Trichloro-1,2,2-trifluoroethane, 1,1,2-	1.75E-04	1.63E-04	1.71E-04	67.6	15	N/A	0.10	4.79E+01	1.75E-04	3.01E+03	#NUM!	1.98E-06	N/A	N/A	3.0E+01
79005	1,1,2-Trichloroethane	5.24E-04	4.95E-04	5.16E-04	67.6	15	N/A	0.10	4.79E+01	5.24E-04	3.01E+03	3.42E+197	2.35E-06	N/A	1.6E-05	2.2E+00
75343	1,1-Dichloroethane	4.68E-04	4.29E-04	4.50E-04	67.6	15	N/A	0.10	4.79E+01	4.58E-04	3.01E+03	1.65E+226	2.35E-06	N/A	N/A	5.0E-01
75354	1,1-Dichloroethylene	5.47E-04	5.12E-04	5.37E-04	67.6	15	8.71E+01	0.10	4.79E+01	5.47E-04	3.01E+03	2.46E+189	2.39E-06	1.60E-04	N/A	2.0E-01
120821	1,2,4-Trichlorobenzene	2.25E-04	2.14E-04	2.22E-04	67.6	15	N/A	0.10	4.79E+01	2.25E-04	3.01E+03	#NUM!	2.10E-06	N/A	N/A	2.0E-01
95501	1,2-Dichlorobenzene	1.56E-02	1.60E-02	1.57E-02	67.6	15	N/A	0.10	4.79E+01	1.56E-02	3.01E+03	4.41E+06	2.64E-06	N/A	N/A	N/A
541731	Dichlorobenzene, 1,3-	2.56E-04	2.40E-04	2.51E-04	67.6	15	N/A	0.10	4.79E+01	2.56E-04	3.01E+03	#NUM!	2.18E-06	N/A	N/A	N/A
106467	1,4-Dichlorobenzene	4.38E-04	4.12E-04	4.31E-04	67.6	15	1.79E+01	0.10	4.79E+01	4.38E-04	3.01E+03	2.05E+236	2.34E-06	4.19E-05	N/A	8.0E-01
78933	Butanone, 2- (MEK)	9.45E-04	9.27E-04	9.40E-04	67.6	15	N/A	0.10	4.79E+01	9.45E-04	3.01E+03	3.81E+109	2.49E-06	N/A	N/A	N/A
67641	Acetone	2.07E-03	2.06E-03	2.07E-03	67.6	15	N/A	0.10	4.79E+01	2.07E-03	3.01E+03	1.22E+60	2.67E-06	N/A	N/A	N/A
71432	Benzene	5.42E-04	5.07E-04	5.32E-04	67.6	15	3.02E+01	0.10	4.79E+01	5.42E-04	3.01E+03	1.94E+191	2.39E-06	7.22E-05	7.8E-06	3.0E-02
74839	Bromomethane	4.46E-04	4.18E-04	4.38E-04	67.6	15	N/A	0.10	4.79E+01	4.46E-04	3.01E+03	1.58E+232	2.34E-06	N/A	N/A	5.0E-03
75150	Carbon Disulfide	6.34E-04	5.94E-04	6.23E-04	67.6	15	N/A	0.10	4.79E+01	6.34E-04	3.01E+03	1.95E+183	2.42E-06	N/A	N/A	7.0E-01
108907	Chlorobenzene	4.65E-04	4.27E-04	4.47E-04	67.6	15	N/A	0.10	4.79E+01	4.65E-04	3.01E+03	3.77E+227	2.35E-06	N/A	N/A	6.0E-02
75003	Ethyl Chloride	7.66E-04	7.16E-04	7.51E-04	67.6	15	N/A	0.10	4.79E+01	7.66E-04	3.01E+03	2.20E+135	2.46E-06	N/A	N/A	1.0E+01
67663	Chloroform	6.43E-04	6.02E-04	6.31E-04	67.6	15	N/A	0.10	4.79E+01	6.43E-04	3.01E+03	1.77E+161	2.43E-06	N/A	2.3E-05	9.8E-02
156592	cis-1,2-Dichloroethylene	4.59E-04	4.30E-04	4.50E-04	67.6	16	2.54E+03	0.10	4.79E+01	4.59E-04	3.01E+03	7.48E+225	2.35E-06	5.97E-03	N/A	2.0E-01
110827	Cyclohexane	4.85E-04	4.63E-04	4.78E-04	67.6	16	N/A	0.10	4.79E+01	4.85E-04	3.01E+03	4.89E+213	2.38E-06	N/A	N/A	#N/A
100414	Ethylbenzene	4.60E-04	4.31E-04	4.52E-04	67.6	16	N/A	0.10	4.79E+01	4.60E-04	3.01E+03	1.47E+225	2.35E-06	N/A	N/A	1.0E+00
98828	Isopropylbenzene	3.96E-04	3.70E-04	3.88E-04	67.6	15	N/A	0.10	4.79E+01	3.95E-04	3.01E+03	1.24E+262	2.31E-06	N/A	N/A	4.0E-01
108872	Methyl cyclohexane	5.96E-04	5.59E-04	5.86E-04	67.6	15	N/A	0.10	4.79E+01	5.88E-04	3.01E+03	2.33E+173	2.41E-06	N/A	N/A	3.0E+00
1634044	Methyl-Tertiary-Butyl Ether	6.67E-04	6.28E-04	6.56E-04	67.6	15	3.11E+02	0.10	4.79E+01	6.67E-04	3.01E+03	2.13E+155	2.43E-06	7.58E-04	N/A	3.0E+00
75092	Methylene chloride	6.36E-04	5.98E-04	6.24E-04	67.6	15	N/A	0.10	4.79E+01	6.35E-04	3.01E+03	1.48E+163	2.42E-06	N/A	4.7E-07	3.0E+00
127184	Tetrachloroethylene	4.39E-04	4.11E-04	4.31E-04	67.6	15	1.41E+02	0.10	4.79E+01	4.39E-04	3.01E+03	1.40E+236	2.34E-06	3.29E-04	5.9E-06	N/A
108883	Toluene	5.34E-04	5.00E-04	5.24E-04	67.6	16	N/A	0.10	4.79E+01	5.34E-04	3.01E+03	1.08E+194	2.39E-06	N/A	N/A	4.0E-01
156605	trans-1,2-Dichloroethylene	4.32E-04	4.04E-04	4.24E-04	67.6	15	N/A	0.10	4.79E+01	4.32E-04	3.01E+03	9.26E+239	2.33E-06	N/A	N/A	2.0E-01
79016	Trichloroethylene	4.83E-04	4.52E-04	4.74E-04	67.6	15	5.16E+03	0.10	4.79E+01	4.83E-04	3.01E+03	2.88E+214	2.36E-06	1.22E-02	1.1E-04	4.0E-02
75014	Vinyl chloride	6.44E-04	6.02E-04	6.32E-04	67.6	15	1.62E+02	0.10	4.79E+01	6.44E-04	3.01E+03	7.47E+160	2.43E-06	3.80E-04	8.8E-06	1.0E-01
1330207	Xylenes	3.75E-03	3.81E-03	3.77E-03	67.6	15	N/A	0.10	4.79E+01	3.75E-03	3.01E+03	4.33E+27	2.61E-06	N/A	N/A	1.0E-01
98862	Acetophenone	2.60E-03	2.64E-03	2.61E-03	67.6	15	N/A	0.10	4.79E+01	2.60E-03	3.01E+03	7.23E-39	2.50E-06	N/A	N/A	N/A
91203	Naphthalene	4.70E-04	4.50E-04	4.64E-04	67.6	15	1.77E+01	0.10	4.79E+01	4.70E-04	3.01E+03	3.02E+220	2.36E-06	4.17E-05	N/A	3.0E-03
91576	Methylnaphthalene, 2-	3.13E-04	2.95E-04	3.08E-04	67.6	15	N/A	0.10	4.79E+01	3.13E-04	3.01E+03	#NUM!	2.23E-06	N/A	N/A	3.0E-03
92524	Biphenyl, 1,1'-	3.16E-04	3.01E-04	3.11E-04	67.6	15	N/A	0.10	4.79E+01	3.16E-04	3.01E+03	#NUM!	2.24E-06	N/A	N/A	N/A
208968	Acenaphthylene	3.39E-04	3.22E-04	3.33E-04	67.6	15	N/A	0.10	4.79E+01	3.38E-04	3.01E+03	7.70E+308	2.28E-06	N/A	N/A	3.0E-03
83329	Acenaphthene	7.33E-04	7.31E-04	7.33E-04	67.6	16	N/A	0.10	4.79E+01	7.33E-04	3.01E+03	1.63E+141	2.45E-06	N/A	N/A	3.0E-03
86737	Fluorene	8.16E-01	8.39E-01	8.22E-01	67.6	15	N/A	0.10	4.79E+01	8.16E-01	3.01E+03	1.34E+00	1.04E-05	N/A	N/A	3.0E-03
85018	Phenanthrene	3.50E-04	3.41E-04	3.47E-04	67.6	15	1.03E+01	0.10	4.79E+01	3.50E-04	3.01E+03	2.42E+298	2.27E-06	2.34E-05	N/A	3.0E-03
120127	Anthracene	1.60E-03	1.62E-03	1.60E-03	67.6	15	N/A	0.10	4.79E+01	1.60E-03	3.01E+03	8.67E+64	2.55E-06	N/A	N/A	3.0E-03
C9-C18	C9-C18 Aliphatics	3.64E-04	3.40E-04	3.57E-04	67.6	15	N/A	0.10	4.79E+01	3.64E-04	3.01E+03	8.02E+284	2.28E-06	N/A	N/A	2.0E-01
C11-C22	C11-C22 Aromatics	4.27E-04	4.05E-04	4.21E-04	67.6	15	N/A	0.10	4.79E+01	4.27E-04	3.01E+03	4.50E+242	2.33E-06	N/A	N/A	5.0E-02
C5-C8	C5-C8 Aliphatics	3.64E-04	3.40E-04	3.57E-04	67.6	15	N/A	0.10	4.79E+01	3.64E-04	3.01E+03	7.81E+284	2.28E-06	N/A	N/A	2.0E-01
C9-C10	C9-C10 Aromatics	3.89E-04	3.46E-04	3.63E-04	67.6	15	N/A	0.10	4.79E+01	3.89E-04	3.01E+03	3.04E+290	2.29E-06	N/A	N/A	5.0E-02
C9-C12	C9-C12 Aliphatics	3.64E-04	3.40E-04	3.57E-04	67.6	15	N/A	0.10	4.79E+01	3.64E-04	3.01E+03	7.99E+284	2.28E-06	N/A	N/A	2.0E-01

Appendix C.4
Johnson & Ettinger Model - Results
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - RME
Southwest Prperties, Wells G&H Superfund Site, Operable Unit 2
Loerjona Auto Parts

		RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:					INCREMENTAL RISK CALCULATIONS:	
		Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final Indoor exposure groundwater conc., (µg/L)	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
71556	1,1,1-Trichloroethane	NA	NA	NA	1.33E+06	N/A	NA	NA
76131	Trichloro-1,2,2-trifluoroethane, 1,1,2-	NA	NA	NA	1.70E+05	N/A	NA	NA
79005	1,1,2-Trichloroethane	NA	NA	NA	4.42E+06	N/A	NA	NA
75343	1,1-Dichloroethane	NA	NA	NA	5.06E+06	N/A	NA	NA
75354	1,1-Dichloroethylene	NA	NA	NA	2.25E+06	N/A	NA	1.8E-08
120821	1,2,4-Trichlorobenzene	NA	NA	NA	3.00E+05	N/A	NA	NA
95501	1,2-Dichlorobenzene	NA	NA	NA	2.77E+07	N/A	NA	NA
541731	Dichlorobenzene, 1,3-	NA	NA	NA	6.88E+04	N/A	NA	NA
106467	1,4-Dichlorobenzene	NA	NA	NA	7.38E+04	N/A	NA	1.2E-09
78933	Butanone, 2- (MEK)	NA	NA	NA	2.23E+08	N/A	NA	NA
67641	Acetone	NA	NA	NA	1.00E+09	N/A	NA	NA
71432	Benzene	NA	NA	NA	1.75E+06	N/A	1.1E-12	5.4E-08
74839	Bromomethane	NA	NA	NA	1.52E+07	N/A	NA	NA
75150	Carbon Disulfide	NA	NA	NA	2.67E+06	N/A	NA	NA
108907	Chlorobenzene	NA	NA	NA	4.72E+05	N/A	NA	NA
75003	Ethyl Chloride	NA	NA	NA	5.32E+06	N/A	NA	NA
67663	Chloroform	NA	NA	NA	7.92E+06	N/A	NA	NA
156592	cis-1,2-Dichloroethylene	NA	NA	NA	3.50E+06	N/A	NA	6.6E-07
110827	Cyclohexane	NA	NA	NA	5.50E+04	N/A	NA	NA
100414	Ethylbenzene	NA	NA	NA	1.69E+05	N/A	NA	NA
98828	Isopropylbenzene	NA	NA	NA	5.60E+04	N/A	NA	NA
108872	Methyl cyclohexane	NA	NA	NA	1.40E+04	N/A	NA	NA
1634044	Methyl-Tertiary-Butyl Ether	NA	NA	NA	5.10E+07	N/A	NA	5.6E-09
75092	Methylene chloride	NA	NA	NA	1.30E+07	N/A	NA	NA
127184	Tetrachloroethylene	NA	NA	NA	2.00E+05	N/A	3.7E-12	NA
108883	Toluene	NA	NA	NA	5.26E+05	N/A	NA	NA
156605	trans-1,2-Dichloroethylene	NA	NA	NA	6.30E+06	N/A	NA	NA
79016	Trichloroethylene	NA	NA	NA	1.10E+06	N/A	2.6E-09	6.8E-06
75014	Vinyl chloride	NA	NA	NA	2.76E+06	N/A	6.6E-12	8.8E-08
1330207	Xylenes	NA	NA	NA	2.20E+05	N/A	NA	NA
98862	Acetophenone	NA	NA	NA	6.13E+06	N/A	NA	NA
91203	Naphthalene	NA	NA	NA	3.10E+04	N/A	NA	3.1E-07
91576	Methylnaphthalene, 2-	NA	NA	NA	2.46E+04	N/A	NA	NA
92524	Biphenyl, 1,1'-	NA	NA	NA	6.94E+03	N/A	NA	NA
208968	Acenaphthylene	NA	NA	NA	3.93E+03	N/A	NA	NA
83329	Acenaphthene	NA	NA	NA	4.24E+03	N/A	NA	NA
86737	Fluorene	NA	NA	NA	1.90E+03	N/A	NA	NA
85018	Phenanthrene	NA	NA	NA	1.28E+03	N/A	NA	1.7E-07
120127	Anthracene	NA	NA	NA	4.34E+01	N/A	NA	NA
C9-C18	C9-C18 Aliphatics	NA	NA	NA	1.00E+04	N/A	NA	NA
C11-C22	C11-C22 Aromatics	NA	NA	NA	5.80E+06	N/A	NA	NA
C5-C8	C5-C8 Aliphatics	NA	NA	NA	1.10E+07	N/A	NA	NA
C9-C10	C9-C10 Aromatics	NA	NA	NA	5.10E+07	N/A	NA	NA
C9-C12	C9-C12 Aliphatics	NA	NA	NA	7.00E+04	N/A	NA	NA

	95% UCL Cancer Risk	95% UCL HI
TOTAL:	3E-09	8E-06

[ ] = Cancer risk > 1E-05 or HQ/HI>1E+00

END

Appendix C.4
Johnson & Ettinger Model - Data Entry Screen
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - CT
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Aberdeens Auto Parts

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	Enter Initial your Chemical	ENTER 95% UCL groundwater conc., C_w (µg/L)	ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, LWT (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR Note	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Exposure time ET (hrs/day)	ENTER Coversion factor CF (hr/yr)
71556	1,1,1-Trichloroethane		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
76131	Trichloro-1,2,2-trifluoroethane, 1,1,2-		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
79005	1,1,2-Trichloroethane		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
75343	1,1-Dichloroethane		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
75354	1,1-Dichloroethylene	1.06E-01	15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
120821	1,2,4-Trichlorobenzene		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
95501	1,2-Dichlorobenzene		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
541731	Dichlorobenzene, 1,3-		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
106467	1,4-Dichlorobenzene	4.66E-01	15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
78933	Butanone, 2- (MEK)		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
67641	Acetone		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
71432	Benzene	2.61E-01	15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
74839	Bromomethane		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
75150	Carbon Disulfide		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
108907	Chlorobenzene		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
75003	Ethyl Chloride		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
67663	Chloroform		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
156592	cis-1,2-Dichloroethylene	6.79E+00	15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
110827	Cyclohexane		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
100414	Ethylbenzene		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
98828	Isopropylbenzene		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
108872	Methyl cyclohexane		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
1634044	Methyl-Tertiary-Butyl Ether	4.21E+00	15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
75092	Methylene chloride		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
127184	Tetrachloroethylene	4.18E-01	15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
108883	Toluene		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
156605	trans-1,2-Dichloroethylene		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
79016	Trichloroethylene	7.51E+00	15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
75014	Vinyl chloride	2.17E-01	15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
1330207	Xylenes		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
98862	Acetophenone		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
91203	Naphthalene	1.32E+00	15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
91576	Methylnaphthalene, 2-		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
92524	Biphenyl, 1,1'-		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
208968	Acenaphthylene		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
83329	Acenaphthene		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
86737	Fluorene		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
85018	Phenanthrene	2.10E+00	15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
120127	Anthracene		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
C9-C18	C9-C18 Aliphatics		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
C11-C22	C11-C22 Aromatics		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
C5-C8	C5-C8 Aliphatics		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
C9-C10	C9-C10 Aromatics		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760
C9-C12	C9-C12 Aliphatics		15	82.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	2	2	26	2.5	8760

Note:
1) Default soil parameters from table 7 of User's Guide for Evaluating Subsurface Vapor Intrusion into Building (U.S. EPA June 19, 2003) were used for soil water filled porosity (θ_w), soil organic carbon fraction (f_{oc}), soil total porosity (n), and soil dry bulk density (ρ_b).

Appendix C.4
Johnson & Ettinger Model - Chemical Properties Screen
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - CT
Southwest Prperties, Wells G&H Superfund Site, Operable Unit 2
Aberjona Auto Parts

Chemical CAS No.	Chemical	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (°C)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (°K)	Critical temperature, T_C (°K)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
71556	1,1,1-Trichloroethane	7.80E-02	8.80E-06	1.72E-02	25	7,136	347.24	545.00	1.10E+02	1.33E+03	N/A	2.2E+00
76131	Trichloro-1,2,2-triflouroethane, 1,	2.88E-02	8.07E-06	5.17E-01	25	1,326	320.70	481.05	2.25E+02	1.70E+02	N/A	3.0E+01
79005	1,1,2-Trichloroethane	7.80E-02	8.80E-06	9.12E-04	25	8,322	386.15	602.00	5.01E+01	4.42E+03	1.6E-05	2.2E+00
75343	1,1-Dichloroethane	7.42E-02	1.05E-05	5.61E-03	25	6,895	330.55	523.00	3.16E+01	5.06E+03	N/A	5.0E-01
75354	1,1-Dichloroethylene	9.00E-02	1.04E-05	2.61E-02	25	6,247	304.75	576.05	5.89E+01	2.25E+03	N/A	2.0E-01
120821	1,2,4-Trichlorobenzene	3.00E-02	8.23E-06	1.42E-03	25	10,471	486.15	725.00	1.78E+03	3.00E+02	N/A	2.0E-01
95501	1,2-Dichlorobenzene	6.88E-02	9.41E-06	1.62E-06	25	1,223	465.00	697.50	5.34E+01	2.77E+04	N/A	N/A
541731	Dichlorobenzene, 1,3-	4.14E-02	8.85E-06	4.70E-03	25	1,242	446.00	683.96	1.70E+02	6.88E+01	N/A	N/A
106467	1,4-Dichlorobenzene	6.90E-02	7.90E-06	2.43E-03	25	9,271	447.21	684.75	6.17E+02	7.38E+01	N/A	8.0E-01
78933	Butanone, 2- (MEK)	8.08E-02	9.80E-06	5.60E-05	25	1,311	352.50	528.75	3.83E+00	2.23E+05	N/A	N/A
67641	Acetone	1.24E-01	1.14E-05	3.88E-05	25	6,955	329.20	508.10	5.75E-01	1.00E+06	N/A	N/A
71432	Benzene	8.80E-02	9.80E-06	5.56E-03	25	7,342	353.24	562.16	5.89E+01	1.75E+03	7.8E-06	3.0E-02
74839	Bromomethane	7.28E-02	1.21E-05	6.22E-03	25	1,362	276.50	414.75	1.43E+01	1.52E+04	N/A	5.0E-03
75150	Carbon Disulfide	1.04E-01	1.29E-05	1.27E-02	25	6,391	319.00	552.00	5.14E+01	2.67E+03	N/A	7.0E-01
108907	Chlorobenzene	7.30E-02	8.70E-06	3.71E-03	25	8,410	404.87	632.40	2.19E+02	4.72E+02	N/A	6.0E-02
75003	Ethyl Chloride	1.26E-01	6.50E-06	8.67E-03	25	1,355	249.00	373.50	1.43E+01	5.32E+03	N/A	1.0E+01
67663	Chloroform	1.04E-01	1.00E-05	3.66E-03	25	6,988	334.32	536.40	3.98E+01	7.92E+03	2.3E-05	5.0E-02
156592	cis-1,2-Dichloroethylene	7.36E-02	1.13E-05	4.07E-03	25	7,192	333.65	544.00	3.55E+01	3.50E+03	N/A	2.0E-01
110827	Cyclohexane	8.00E-02	9.00E-06	2.00E+00	25	1,309	353.85	530.78	1.60E+02	5.50E+01	#N/A	#N/A
100414	Ethylbenzene	7.50E-02	7.80E-06	7.88E-03	25	8,501	409.34	617.20	3.63E+02	1.69E+02	N/A	1.0E+00
98828	Isopropylbenzene	6.50E-02	7.83E-06	1.47E-02	25	1,259	425.40	631.01	9.31E+03	5.60E+01	N/A	4.0E-01
108872	Methyl cyclohexane	9.86E-02	8.52E-06	4.23E-01	25	1,296	373.90	560.85	2.68E+02	1.40E+01	N/A	3.0E+00
1634044	Methyl-Tertiary-Butyl Ether	1.02E-01	1.05E-05	5.87E-04	25	1,324	328.36	497.11	3.84E+01	5.10E+04	N/A	3.0E+00
75092	Methylene chloride	1.01E-01	1.17E-05	2.19E-03	25	6,706	313.00	510.00	1.17E+01	1.30E+04	4.7E-07	3.0E+00
127184	Tetrachloroethylene	7.20E-02	8.20E-06	1.84E-02	25	8,288	394.40	620.20	1.55E+02	2.00E+02	5.9E-06	N/A
108883	Toluene	8.70E-02	8.60E-06	6.63E-03	25	7,930	383.78	591.79	1.82E+02	5.26E+02	N/A	4.0E-01
156605	trans-1,2-Dichloroethylene	7.07E-02	1.19E-05	9.39E-03	25	1,333	320.85	516.50	5.25E+01	6.30E+03	N/A	2.0E-01
79016	Trichloroethylene	7.90E-02	9.10E-06	1.03E-02	25	7,505	360.36	544.20	1.66E+02	1.10E+03	1.1E-04	4.0E-02
75014	Vinyl chloride	1.06E-01	1.23E-05	2.71E-02	25	5,250	259.25	432.00	1.86E+01	2.76E+03	8.8E-06	1.0E-01
1330207	Xylenes	7.69E-02	8.44E-06	6.73E-06	25	1,264	417.40	616.21	2.41E+02	2.20E+02	N/A	1.0E-01
98862	Acetophenone	6.00E-02	8.73E-06	1.02E-05	25	1,214	475.00	712.50	4.62E+01	6.13E+03	N/A	N/A
91203	Naphthalene	5.90E-02	7.50E-06	4.83E-04	25	10,373	491.14	748.40	2.00E+03	3.10E+01	N/A	3.0E-03
91576	Methylnaphthalene, 2-	4.84E-02	7.75E-06	1.01E-03	25	1,169	514.05	761.01	8.51E+03	2.46E+01	N/A	3.0E-03
92524	Biphenyl, 1,1'-	4.04E-02	8.15E-06	3.03E-04	25	1,149	529.10	793.65	6.25E+03	6.94E+00	N/A	N/A
208968	Acenaphthylene	4.43E-02	7.44E-06	2.80E-04	25	1,118	553.00	792.01	4.79E+03	3.93E+00	N/A	3.0E-03
83329	Acenaphthene	4.21E-02	7.69E-06	1.55E-04	25	12,155	550.54	803.15	7.08E+03	4.24E+00	N/A	3.0E-03
86737	Fluorene	3.63E-02	7.88E-06	9.41E-08	25	12,666	570.44	870.00	7.71E+03	1.90E+00	N/A	3.0E-03
85018	Phenanthrene	3.30E-02	7.47E-06	1.30E-04	25	1,057	613.00	869.01	1.41E+04	1.28E+00	N/A	3.0E-03
120127	Anthracene	3.24E-02	7.74E-06	6.51E-05	25	13,121	615.18	873.00	2.95E+04	4.34E-02	N/A	3.0E-03
C9-C18	C9-C18 Aliphatics	6.00E-02	1.00E-05	1.66E+00	25	NA	NA	NA	6.80E+05	1.00E+01	N/A	2.0E-01
C11-C22	C11-C22 Aromatics	6.00E-02	1.00E-05	7.32E-04	25	NA	NA	NA	5.00E+03	5.80E+03	N/A	5.0E-02
C5-C8	C5-C8 Aliphatics	6.00E-02	1.00E-05	1.30E+00	25	NA	NA	NA	2.27E+03	1.10E+04	N/A	2.0E-01
C9-C10	C9-C10 Aromatics	6.00E-02	1.00E-05	7.92E-03	25	NA	NA	NA	1.78E+03	5.10E+04	N/A	5.0E-02
C9-C12	C9-C12 Aliphatics	6.00E-02	1.00E-05	1.56E+00	25	NA	NA	NA	1.50E+05	7.00E+01	N/A	2.0E-01

Appendix C.4
Johnson & Ettinger Model - Calculations Screen
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - CT
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Aberlone Auto Parts

		Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^v (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_e (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, Xcrack (cm)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)
71556	1,1,1-Trichloroethane	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	7,865	8.50E-03	3.66E-01
76131	Trichloro-1,2,2-trifluoroethane, 1,1,2-	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1,436	4.55E-01	1.96E+01
79005	1,1,2-Trichloroethane	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1,436	4.55E-01	1.96E+01
75343	1,1-Dichloroethane	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	6,572	3.88E-04	1.67E-02
75354	1,1-Dichloroethylene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	7,450	2.88E-03	1.24E-01
120821	1,2,4-Trichlorobenzene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	8,392	1.47E-02	6.34E-01
95501	1,2-Dichlorobenzene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	13,230	4.35E-04	1.87E-02
541731	Dichlorobenzene, 1,3-	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1,521	1.41E-06	6.09E-05
106467	1,4-Dichlorobenzene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1,503	4.11E-03	1.77E-01
78933	Butanone, 2- (MEK)	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	11,243	8.89E-04	3.83E-02
67641	Acetone	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1,486	4.90E-05	2.11E-03
71432	Benzene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	7,558	1.97E-03	8.50E-02
74839	Bromomethane	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	8,122	2.69E-03	1.16E-01
75150	Carbon Disulfide	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1,337	5.52E-03	2.38E-01
108907	Chlorobenzene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	6,682	6.99E-03	3.01E-01
75003	Ethyl Chloride	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	9,603	1.54E-03	6.65E-02
67663	Chloroform	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1,201	7.79E-03	3.35E-01
156592	cis-1,2-Dichloroethylene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	7,554	1.86E-03	8.02E-02
110827	Cyclohexane	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	7,734	2.04E-03	8.77E-02
100414	Ethylbenzene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1,456	1.75E+00	7.54E+01
98828	Isopropylbenzene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	10,155	3.18E-03	1.37E-01
108872	Methyl cyclohexane	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1,540	1.26E-02	5.51E-01
1634044	Methyl-Tertiary-Butyl Ether	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1,505	3.70E-01	1.59E+01
75092	Methylene chloride	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1,447	5.16E-04	2.22E-02
127184	Tetrachloroethylene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	7,934	1.17E-02	5.03E-02
108883	Toluene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	9,553	7.83E-03	3.37E-01
156605	trans-1,2-Dichloroethylene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	9,154	2.92E-03	1.26E-01
79016	Trichloroethylene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1,417	8.27E-03	3.56E-01
75014	Vinyl chloride	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	6,557	4.79E-03	2.06E-01
1330207	Xylenes	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	8,000	1.73E-02	7.46E-01
98862	Acetophenone	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1,542	5.86E-06	2.52E-04
91203	Naphthalene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1,518	8.81E-06	3.83E-04
91576	Methylnaphthalene, 2-	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	12,913	1.52E-04	6.55E-03
92524	Biphenyl, 1,1'-	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1,506	8.86E-04	3.81E-02
208968	Acenaphthylene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1,472	2.66E-04	1.14E-02
83329	Acenaphthene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1,513	2.45E-04	1.05E-02
86737	Fluorene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	16,123	3.67E-05	1.58E-03
85018	Phenanthrene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	16,235	2.20E-06	9.48E-05
120127	Anthracene	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	1,479	1.14E-04	4.90E-03
C9-C18	C9-C18 Aliphatics	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	16,353	1.26E-05	5.43E-04
C11-C22	C11-C22 Aromatics	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	NA	8.28E-01	3.56E+01
C5-C8	C5-C8 Aliphatics	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	NA	3.60E-04	1.55E-02
C9-C10	C9-C10 Aromatics	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	NA	6.48E-01	2.78E+01
C9-C12	C9-C12 Aliphatics	67.6	0.130	0.659	1.62E-08	0.390	6.33E-09	18.75	0.43	0.127	0.303	3.01E+04	1.81E+07	5.67E+07	5.31E-05	15	NA	3.96E-03	1.70E-01
																		7.80E-01	3.36E+01

Appendix C.4
Johnson & Ettinger Model - Calculations Screen
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - CT
Southwest Properties, Wells G&H Superfund Site, Open
Aberjona Auto Parts

		Vapor viscosity at ave. soil temperature, μ_{ms} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_v (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_t, (cm^2/s)	Diffusion path length, L_d (cm)	Convection path length, L_v (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
71556	1,1,1-Trichloroethane	1.75E-04	4.75E-04	4.45E-04	4.68E-04	67.6	15	N/A	0.10	4.79E+01	4.75E-04	3.01E+03	1.21E+218	2.36E-06	N/A	N/A	2.2E+00
76131	Trichloro-1,2,2-trifluoroethane, 1,1,2-	1.75E-04	1.75E-04	1.63E-04	1.71E-04	67.6	15	N/A	0.10	4.79E+01	1.75E-04	3.01E+03	#NUM!	1.98E-06	N/A	N/A	3.0E+01
79005	1,1,2-Trichloroethane	1.75E-04	5.24E-04	4.95E-04	5.16E-04	67.6	15	N/A	0.10	4.79E+01	5.24E-04	3.01E+03	3.42E+197	2.36E-06	N/A	1.6E-05	2.2E+00
75343	1,1-Dichloroethane	1.75E-04	4.58E-04	4.29E-04	4.50E-04	67.6	15	N/A	0.10	4.79E+01	4.58E-04	3.01E+03	1.65E+225	2.39E-06	N/A	N/A	5.0E-01
75354	1,1-Dichloroethylene	1.75E-04	5.47E-04	5.12E-04	5.37E-04	67.6	15	6.71E+01	0.10	4.79E+01	5.47E-04	3.01E+03	2.46E+189	2.39E-06	1.80E-04	N/A	2.0E-01
120821	1,2,4-Trichlorobenzene	1.75E-04	2.25E-04	2.14E-04	2.22E-04	67.6	15	N/A	0.10	4.79E+01	2.25E-04	3.01E+03	#NUM!	2.10E-06	N/A	N/A	2.0E-01
95501	1,2-Dichlorobenzene	1.75E-04	1.56E-02	1.60E-02	1.57E-02	67.6	15	N/A	0.10	4.79E+01	1.56E-02	3.01E+03	4.41E+06	2.64E-06	N/A	N/A	N/A
541731	Dichlorobenzene, 1,3-	1.75E-04	2.56E-04	2.40E-04	2.51E-04	67.6	15	N/A	0.10	4.79E+01	2.56E-04	3.01E+03	#NUM!	2.16E-06	N/A	N/A	N/A
106467	1,4-Dichlorobenzene	1.75E-04	4.38E-04	4.12E-04	4.31E-04	67.6	15	1.79E+01	0.10	4.79E+01	4.38E-04	3.01E+03	2.05E+236	2.34E-06	4.19E-05	N/A	8.0E-01
78933	Butanone, 2- (MEK)	1.75E-04	9.45E-04	9.27E-04	9.40E-04	67.6	15	N/A	0.10	4.79E+01	9.45E-04	3.01E+03	3.61E+109	2.49E-06	N/A	N/A	N/A
67641	Acetone	1.75E-04	2.07E-03	2.06E-03	2.07E-03	67.6	15	N/A	0.10	4.79E+01	2.07E-03	3.01E+03	1.22E+50	2.57E-06	N/A	N/A	N/A
71432	Benzene	1.75E-04	5.42E-04	5.07E-04	5.32E-04	67.6	15	3.02E+01	0.10	4.79E+01	5.42E-04	3.01E+03	1.94E+191	2.39E-06	7.22E-05	7.8E-06	3.0E-02
74839	Bromomethane	1.75E-04	4.46E-04	4.18E-04	4.38E-04	67.6	15	N/A	0.10	4.79E+01	4.46E-04	3.01E+03	1.58E+232	2.34E-06	N/A	N/A	5.0E-03
75150	Carbon Disulfide	1.75E-04	6.34E-04	5.94E-04	6.23E-04	67.6	15	N/A	0.10	4.79E+01	6.34E-04	3.01E+03	1.95E+183	2.42E-06	N/A	N/A	7.0E-01
108907	Chlorobenzene	1.75E-04	4.55E-04	4.27E-04	4.47E-04	67.6	15	N/A	0.10	4.79E+01	4.55E-04	3.01E+03	3.77E+227	2.35E-06	N/A	N/A	6.0E-02
75003	Ethyl Chloride	1.75E-04	7.66E-04	7.16E-04	7.51E-04	67.6	15	N/A	0.10	4.79E+01	7.66E-04	3.01E+03	2.20E+135	2.46E-06	N/A	N/A	1.0E+01
67663	Chloroform	1.75E-04	6.43E-04	6.02E-04	6.31E-04	67.6	15	N/A	0.10	4.79E+01	6.43E-04	3.01E+03	1.77E+181	2.43E-06	N/A	2.3E-05	9.8E-02
156592	cis-1,2-Dichloroethylene	1.75E-04	4.89E-04	4.30E-04	4.50E-04	67.6	15	5.95E+02	0.10	4.79E+01	4.59E-04	3.01E+03	7.48E+225	2.35E-06	1.40E-03	N/A	2.0E-01
110827	Cyclohexane	1.75E-04	4.65E-04	4.53E-04	4.76E-04	67.6	15	N/A	0.10	4.79E+01	4.65E-04	3.01E+03	4.69E+213	2.36E-06	N/A	#N/A	#N/A
100414	Ethylbenzene	1.75E-04	4.80E-04	4.31E-04	4.52E-04	67.6	15	N/A	0.10	4.79E+01	4.80E-04	3.01E+03	1.47E+225	2.35E-06	N/A	N/A	1.0E+00
98828	Isopropylbenzene	1.75E-04	3.95E-04	3.70E-04	3.88E-04	67.6	15	N/A	0.10	4.79E+01	3.95E-04	3.01E+03	1.24E+262	2.31E-06	N/A	N/A	4.0E-01
108872	Methyl cyclohexane	1.75E-04	5.98E-04	5.59E-04	5.86E-04	67.6	15	N/A	0.10	4.79E+01	5.98E-04	3.01E+03	2.33E+173	2.41E-06	N/A	N/A	3.0E+00
1634044	Methyl-Tertiary-Butyl Ether	1.75E-04	6.67E-04	6.28E-04	6.56E-04	67.6	15	9.35E+01	0.10	4.79E+01	6.67E-04	3.01E+03	2.13E+155	2.43E-06	2.28E-04	N/A	3.0E+00
75092	Methylene chloride	1.75E-04	6.35E-04	5.96E-04	6.24E-04	67.6	15	N/A	0.10	4.79E+01	6.35E-04	3.01E+03	1.48E+183	2.42E-06	N/A	4.7E-07	3.0E+00
127184	Tetrachloroethylene	1.75E-04	4.39E-04	4.11E-04	4.31E-04	67.6	15	1.41E+02	0.10	4.79E+01	4.39E-04	3.01E+03	1.40E+236	2.34E-06	3.29E-04	5.9E-06	N/A
108883	Toluene	1.75E-04	5.34E-04	5.00E-04	5.24E-04	67.6	15	N/A	0.10	4.79E+01	5.34E-04	3.01E+03	1.08E+194	2.39E-06	N/A	N/A	4.0E-01
156605	trans-1,2-Dichloroethylene	1.75E-04	4.32E-04	4.04E-04	4.24E-04	67.6	15	N/A	0.10	4.79E+01	4.32E-04	3.01E+03	9.26E+239	2.33E-06	N/A	N/A	2.0E-01
79016	Trichloroethylene	1.75E-04	4.83E-04	4.52E-04	4.74E-04	67.6	15	1.55E+03	0.10	4.79E+01	4.83E-04	3.01E+03	2.88E+214	2.36E-06	3.86E-03	1.1E-04	4.0E-02
75014	Vinyl chloride	1.75E-04	8.44E-04	8.02E-04	8.32E-04	67.6	15	1.62E+02	0.10	4.79E+01	8.44E-04	3.01E+03	7.47E+160	2.43E-06	3.93E-04	8.8E-06	1.0E-01
1330207	Xylenes	1.75E-04	3.75E-03	3.81E-03	3.77E-03	67.6	15	N/A	0.10	4.79E+01	3.75E-03	3.01E+03	4.33E+27	2.61E-06	N/A	N/A	1.0E-01
98862	Acetophenone	1.75E-04	2.60E-03	2.64E-03	2.61E-03	67.6	15	N/A	0.10	4.79E+01	2.60E-03	3.01E+03	7.28E+39	2.59E-06	N/A	N/A	N/A
91203	Naphthalene	1.75E-04	4.70E-04	4.50E-04	4.64E-04	67.6	15	8.64E+00	0.10	4.79E+01	4.70E-04	3.01E+03	3.02E+220	2.36E-06	2.04E-05	N/A	3.0E-03
91576	Methylnaphthalene, 2-	1.75E-04	3.13E-04	2.95E-04	3.08E-04	67.6	15	N/A	0.10	4.79E+01	3.13E-04	3.01E+03	#NUM!	2.23E-06	N/A	N/A	3.0E-03
92524	Biphenyl, 1,1'-	1.75E-04	3.15E-04	3.01E-04	3.11E-04	67.6	15	N/A	0.10	4.79E+01	3.15E-04	3.01E+03	#NUM!	2.24E-06	N/A	N/A	N/A
208968	Acenaphthylene	1.75E-04	3.36E-04	3.22E-04	3.33E-04	67.6	15	N/A	0.10	4.79E+01	3.36E-04	3.01E+03	7.70E+306	2.25E-06	N/A	N/A	3.0E-03
83329	Acenaphthene	1.75E-04	7.33E-04	7.31E-04	7.33E-04	67.6	15	N/A	0.10	4.79E+01	7.33E-04	3.01E+03	1.83E+141	2.45E-06	N/A	N/A	3.0E-03
86737	Fluorene	1.75E-04	8.16E-01	8.39E-01	8.22E-01	67.6	15	N/A	0.10	4.79E+01	8.18E-01	3.01E+03	1.34E+00	1.04E-05	N/A	N/A	3.0E-03
85018	Phenanthrene	1.75E-04	3.50E-04	3.41E-04	3.47E-04	67.6	15	1.03E+01	0.10	4.79E+01	3.50E-04	3.01E+03	2.42E+296	2.27E-06	2.34E-05	N/A	3.0E-03
120127	Anthracene	1.75E-04	1.60E-03	1.62E-03	1.60E-03	67.6	15	N/A	0.10	4.79E+01	1.60E-03	3.01E+03	8.67E+64	2.55E-06	N/A	N/A	3.0E-03
C9-C18	C9-C18 Aliphatics	1.75E-04	3.64E-04	3.40E-04	3.57E-04	67.6	15	N/A	0.10	4.79E+01	3.64E-04	3.01E+03	8.02E+284	2.25E-06	N/A	N/A	2.0E-01
C11-C22	C11-C22 Aromatics	1.75E-04	4.27E-04	4.03E-04	4.21E-04	67.6	15	N/A	0.10	4.79E+01	4.27E-04	3.01E+03	4.60E+242	2.33E-06	N/A	N/A	5.0E-02
C5-C8	C5-C8 Aliphatics	1.75E-04	3.64E-04	3.40E-04	3.57E-04	67.6	15	N/A	0.10	4.79E+01	3.64E-04	3.01E+03	7.91E+284	2.25E-06	N/A	N/A	2.0E-01
C9-C10	C9-C10 Aromatics	1.75E-04	3.66E-04	3.46E-04	3.63E-04	67.6	15	N/A	0.10	4.79E+01	3.66E-04	3.01E+03	3.04E+260	2.29E-06	N/A	N/A	5.0E-02
C9-C12	C9-C12 Aliphatics	1.75E-04	3.64E-04	3.40E-04	3.57E-04	67.6	15	N/A	0.10	4.79E+01	3.64E-04	3.01E+03	7.99E+284	2.25E-06	N/A	N/A	2.0E-01

Appendix C.4
Johnson & Ettinger Model - Results
Inhalation of Volatiles from Groundwater
Future Child Recreational Scenario - CT
Southwest Prperties, Wells G&H Superfund Site, Operable Unit 2
Aberjona Auto Parts

		RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:					INCREMENTAL RISK CALCULATIONS:	
		Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
71556	1,1,1-Trichloroethane	NA	NA	NA	1.33E+06	NA	NA	NA
76131	Trichloro-1,2,2-triflouroethane, 1,1,2-	NA	NA	NA	1.70E+05	NA	NA	NA
79005	1,1,2-Trichloroethane	NA	NA	NA	4.42E+06	NA	NA	NA
75343	1,1-Dichloroethane	NA	NA	NA	5.06E+06	NA	NA	NA
75354	1,1-Dichloroethylene	NA	NA	NA	2.25E+06	NA	NA	6.0E-09
120821	1,2,4-Trichlorobenzene	NA	NA	NA	3.00E+05	NA	NA	NA
95501	1,2-Dichlorobenzene	NA	NA	NA	2.77E+07	NA	NA	NA
541731	Dichlorobenzene, 1,3-	NA	NA	NA	6.88E+04	NA	NA	NA
106467	1,4-Dichlorobenzene	NA	NA	NA	7.38E+04	NA	NA	3.9E-10
78933	Butanone, 2- (MEK)	NA	NA	NA	2.23E+08	NA	NA	NA
67641	Acetone	NA	NA	NA	1.00E+09	NA	NA	NA
71432	Benzene	NA	NA	NA	1.75E+06	NA	1.2E-13	1.8E-08
74839	Bromomethane	NA	NA	NA	1.52E+07	NA	NA	NA
75150	Carbon Disulfide	NA	NA	NA	2.67E+06	NA	NA	NA
108907	Chlorobenzene	NA	NA	NA	4.72E+05	NA	NA	NA
75003	Ethyl Chloride	NA	NA	NA	5.32E+06	NA	NA	NA
67663	Chloroform	NA	NA	NA	7.92E+06	NA	NA	NA
156592	cis-1,2-Dichloroethylene	NA	NA	NA	3.50E+06	NA	NA	5.2E-08
110827	Cyclohexane	NA	NA	NA	5.50E+04	NA	NA	NA
100414	Ethylbenzene	NA	NA	NA	1.69E+05	NA	NA	NA
98828	Isopropylbenzene	NA	NA	NA	5.60E+04	NA	NA	NA
108872	Methyl cyclohexane	NA	NA	NA	1.40E+04	NA	NA	NA
1634044	Methyl-Tertiary-Butyl Ether	NA	NA	NA	5.10E+07	NA	NA	5.6E-10
75092	Methylene chloride	NA	NA	NA	1.30E+07	NA	NA	NA
127184	Tetrachloroethylene	NA	NA	NA	2.00E+05	NA	4.1E-13	NA
108883	Toluene	NA	NA	NA	5.26E+05	NA	NA	NA
156605	trans-1,2-Dichloroethylene	NA	NA	NA	6.30E+06	NA	NA	NA
79016	Trichloroethylene	NA	NA	NA	1.10E+06	NA	8.5E-11	6.8E-07
75014	Vinyl chloride	NA	NA	NA	2.76E+06	NA	7.3E-13	2.9E-08
1330207	Xylenes	NA	NA	NA	2.20E+05	NA	NA	NA
98862	Acetophenone	NA	NA	NA	6.13E+06	NA	NA	NA
91203	Naphthalene	NA	NA	NA	3.10E+04	NA	NA	5.0E-08
91576	Methylnaphthalene, 2-	NA	NA	NA	2.46E+04	NA	NA	NA
92524	Biphenyl, 1,1'-	NA	NA	NA	6.94E+03	NA	NA	NA
208968	Acenaphthylene	NA	NA	NA	3.93E+03	NA	NA	NA
83329	Acenaphthene	NA	NA	NA	4.24E+03	NA	NA	NA
86737	Fluorene	NA	NA	NA	1.90E+03	NA	NA	NA
85018	Phenanthrene	NA	NA	NA	1.28E+03	NA	NA	5.8E-08
120127	Anthracene	NA	NA	NA	4.34E+01	NA	NA	NA
C9-C18	C9-C18 Aliphatics	NA	NA	NA	1.00E+04	NA	NA	NA
C11-C22	C11-C22 Aromatics	NA	NA	NA	5.80E+06	NA	NA	NA
C5-C8	C5-C8 Aliphatics	NA	NA	NA	1.10E+07	NA	NA	NA
C9-C10	C9-C10 Aromatics	NA	NA	NA	5.10E+07	NA	NA	NA
C9-C12	C9-C12 Aliphatics	NA	NA	NA	7.00E+04	NA	NA	NA

	95% UCL Cancer Risk	95% UCL HI
TOTAL:	9E-11	9E-07

[ ] = Cancer risk > 1E-05 or HQ/HI>1E+00

END

Appendix C.4
Johnson & Ettinger Model - Data Entry Screen
Inhalation of Volatiles from Groundwater
Future Adult Resident Scenario - RME
Southwest Properties, Wells G&H Superfund Site, Operable Unit 2
Aberjona Auto Parts

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION
(enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	Chemical	Error Initial groundwater	ENTER 95% UCL groundwater conc., C_W (µg/L)	ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Depth below grade to water table, LWT (cm)	ENTER SCS soil type directly above water table	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR Note	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)	ENTER Vadose zone soil dry bulk density, ρ_b^V (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Exposure time ET (hrs/day)	ENTER Coversion factor CF (hrs/yr)
71556	1,1,1-Trichloroethane			52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
76131	Trichloro-1,2,2-trifluoroethane, 1,1,2-			52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
79005	1,1,2-Trichloroethane			52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
75343	1,1-Dichloroethane			52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
75354	1,1-Dichloroethylene	1.94E-01		52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
120821	1,2,4-Trichlorobenzene			52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
95501	1,2-Dichlorobenzene			52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
541731	Dichlorobenzene, 1,3-			52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
106467	1,4-Dichlorobenzene	4.84E-01		52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
78933	Butanone, 2- (MEK)			52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
67641	Acetone			52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
71432	Benzene	1.00E-01		52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
74839	Bromomethane			52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
75150	Carbon Disulfide			52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
108907	Chlorobenzene			52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
75003	Ethyl Chloride			52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
67663	Chloroform			52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
156592	cis-1,2-Dichloroethylene	8.06E+00		52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
110827	Cyclohexane			52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
100414	Ethylbenzene			52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
98828	Isopropylbenzene			52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
108872	Methyl cyclohexane			52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
1634044	Methyl Tertiary Butyl Ether			52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
75092	Methylene chloride			52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
127184	Tetrachloroethylene	4.18E-01		52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
108883	Toluene			52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
156605	trans-1,2-Dichloroethylene			52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
79016	Trichloroethylene	2.50E+01		52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
75014	Vinyl chloride	2.49E-01		52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
1330207	Xylenes			52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
98862	Acetophenone			52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
91203	Naphthalene	2.79E+00		52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
91576	Methylnaphthalene, 2-			52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
92524	Biphenyl, 1,1'-			52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
208968	Acenaphthylene			52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
83329	Acenaphthene			52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
86737	Fluorene			52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
85018	Phenanthrene	2.10E+00		52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
120127	Anthracene			52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
C9-C18	C9-C18 Aliphatics			52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
C11-C22	C11-C22 Aromatics			52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
C5-C8	C5-C8 Aliphatics			52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
C9-C10	C9-C10 Aromatics			52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760
C9-C12	C9-C12 Aliphatics			52.12	52.6	LS	10	LS	1		1.5	0.43	0.3	1.0E-06	1	70	24	24	350	16	8760

Note:
1) Default soil parameters from table 7 of User's Guide for Evaluating Subsurface Vapor Intrusion into Building (U.S. EPA June 19, 2003) were used for soil water filled porosity ($\theta_{w,i}$), soil organic carbon fraction (f_{oc}), soil total porosity (n), and soil dry bulk density (ρ_b).